Medtronic
PHYSIO-CONTROL

LIFEPAK® 500 automated external defibrillator

Service Manual

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Preface

This Electronic Service Manual is intended for use by technical service personnel. It describes how to maintain, test, troubleshoot, and repair LIFEPAK 500 monophasic and biphasic automated external defibrillators (AEDs). The LIFEPAK 500 AED **Operating Instructions**, intended for use by physicians, clinicians, and emergency care providers, provides step-by-step instructions for the operating features of the LIFEPAK 500 AED as well as operator-level testing and maintenance. The LIFEPAK 500 AED **Setup Instructions** provides descriptions of the various setup options available and procedures for making setup changes.

Note: The LIFEPAK 500 operating and setup instructions included on the service manual CD are the U.S. domestic versions. You should refer to the instructions that came with your AED for details on your particular unit.

This section of the service manual includes trademark and warranty information and a glossary of frequently used terms. Click one of the links below to jump to a topic.

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Physio-Control Corp.
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Responsibility for Information

This electronic service manual describes the methods required to maintain, test, and repair the LIFEPAK 500 AED. The LIFEPAK 500 AED electronic service manual does not cover operation of the AED in the clinical setting. Qualified service personnel must consult the LIFEPAK 500 AED **Operating Instructions**, the LIFEPAK 500 AED **Setup Instructions**, and this LIFEPAK 500 AED electronic service manual to obtain a complete understanding of the use and maintenance of the AED.

Note: The LIFEPAK 500 operating and setup instructions included on this service manual CD are the U.S. domestic versions. You should refer to the instructions that came with your AED for details on your particular unit.

It is the responsibility of our customers to ensure that the appropriate person(s) within their organization have access to the information in this electronic service manual, including any warnings and cautions used throughout the LIFEPAK 500 AED electronic service manual.

Unit Tracking

U.S. only, including U.S. government-owned units:

The Food and Drug Administration requires defibrillator manufacturers and distributors to track the location of their defibrillators. If your defibrillator has been sold, donated, lost, stolen, exported, or destroyed, or if it was not obtained directly from Medtronic Physio-Control, please notify Medtronic Physio-Control at 1.800.442.1142, extension 4530.

General information related to unit tracking:

As a matter of general practice, it is important to maintain accurate records of defibrillator location. These records will enable you to quickly locate defibrillators in the event of a product upgrade or recall. Defibrillators should be tracked by both the manufacturer's part number and serial number. Internal asset or tracking numbers may also be useful in maintaining adequate control of defibrillators.

Service Information

Before attempting to clean or repair any assembly in this AED, service personnel should be familiar with the information provided in the **Preventive Maintenance** section.

A qualified service person should inspect any defibrillator that has been dropped, damaged, or abused to verify that the AED is operating within performance standards listed in the **Performance Inspection Procedure (PIP)**, and that the leakage current values are acceptable.

Component replacement for the LIFEPAK 500 AED is limited to those items accessible at the final assembly level. Component replacement and AED testing must only be performed by service personnel qualified by appropriate training and experience.

For servicing and maintaining the LIFEPAK 500 AED, contact your local Medtronic Physio-Control service or sales representative. In the U.S., call Medtronic Physio-Control Technical Services at 1.800.442.1142. Outside the U.S., contact your local Medtronic Physio-Control representative.

Unit Recycling

Recycle the AED at the end of its useful life.

- Preparation – The AED should be clean and contaminant-free prior to being recycled.
- Recycling Assistance – The AED should be recycled according to national, regional, and local regulations. Contact your local Medtronic Physio-Control representative for assistance.
- Recycling of Disposable Electrodes – After using disposable electrodes, follow your local clinical procedures for recycling.
- Recycling of Batteries – Follow instructions given in this electronic service manual and local guidelines for recycling rechargeable sealed lead-acid batteries. Follow instructions given in this electronic service manual for discharging and discarding nonrechargeable lithium batteries.
- Packaging – Packaging should be recycled according to national, regional, and local regulations.

Warranty

Before requesting warranty service for your AED, refer to the LIFEPAK 500 AED **Setup Instructions** to ensure that your AED is setup properly, and refer to the LIFEPAK 500 AED **Operating Instructions** to ensure that you are operating the AED correctly.

Note: The LIFEPAK 500 operating and setup instructions included on this service manual CD are the U.S. domestic versions. You should refer to the instructions that came with your AED for details on your particular unit.

If you determine that service or technical support is necessary, please record the AED serial number and part number and have them available when you contact Medtronic Physio-Control.

For warranty terms, refer to the warranty statement included with the product. Duplicate copies may be obtained by contacting your local Medtronic Physio-Control sales or service office.

Configuration Information

With the introduction of the LIFEPAK 500 Biphasic AED, Medtronic Physio-Control implemented a **Parts Configurator**. Information regarding an AED's configuration may be obtained by clicking on the **Parts Configurator** link. The previous configuration scheme, as indicated by final assembly part numbers with a three-digit dash number, is current through the following AED part numbers:

- LIFEPAK 500 Monophasic AEDs 3005400-000 through 3005400-335

Monophasic AEDs starting with operating system version 4.5, and all biphasic AEDs, have part numbers with six-digit variants. Depending on the waveform technology, these part numbers are of the form:

- 3005400-XXXXXX for the LIFEPAK 500 Monophasic AED
- 3011790-XXXXXX for the LIFEPAK 500 Biphasic AED

Unless otherwise noted, functions and features are consistent as specified throughout this manual. Differences are noted as appropriate. For information about attributes of a particular LIFEPAK 500 AED, with a three-digit dash number in its part number, consult the **Product Line History** in the Parts Lists and Assembly Diagrams section.

Glossary

This section provides definitions of terms used throughout this service manual.

- Automated External Defibrillator (AED) – The LIFEPAK 500 AED uses an ECG analysis Shock Advisory System to advise the AED operator if it detects a shockable or nonshockable rhythm. See the **Overview of the Shock Advisory System** in the LIFEPAK 500 AED Operating Instructions for additional details.
- Biphasic – Property of the shock waveform generated by the LIFEPAK 500 Biphasic AED. The biphasic waveform is characterized by a positive current phase followed by a reverse current phase of shorter duration and decreased magnitude. The biphasic waveform pulse characteristic is truncated exponential (BTE).
- CODE SUMMARY™ critical event record – A summary report that includes the ECG segments associated with key events such as analysis or shock. See a sample **CODE SUMMARY Report** in the LIFEPAK 500 AED Operating Instructions.
- Event Log Report – A report listing all of the events that occurred during a patient use. The clock time and elapsed time are listed for each event. See a sample **Event Log Report** in the LIFEPAK 500 AED Operating Instructions.
- Event Log Summary – A report summarizing important events for a particular patient record; part of the Event Log Report.

Glossary

- FAST-PATCH® defibrillation cable – Defibrillation cable for attaching FAST-PATCH disposable defibrillation/ECG electrodes to the AED.
- Monophasic – Property of the shock waveform generated by the LIFEPAK 500 Monophasic AED. The monophasic pulse (Edmark) characteristic is damped sinusoid per AAMI DF2-1989 3.2.1.5.1.
- QUIK-COMBO™ pacing/defibrillation/ECG electrodes system – An electrode system that allows delivery of therapy to the patient.
- QUIK-COMBO patient simulator – A combination lead tester/patient cardiac rhythm simulator. The simulator is designed for use in training clinical personnel in the operation of the LIFEPAK 500 AED.
- REDI-PAK™ preconnect system – A variant of the QUIK-COMBO electrodes. The system allows preconnection of QUIK-COMBO electrodes to the AED without removing the electrodes from their air-tight sealed pouch until needed for patient treatment.
- Test Load – A device that provides an external test load for the AED. The test load connects to the patient connector on the AED.
- Test Log Report – A report listing the time and results of the Auto Tests and Test Load Tests. If a test fails, the report lists fault codes that can help authorized service personnel troubleshoot and repair the AED. See a sample **Test Log Report** in the LIFEPAK 500 AED **Operating Instructions**.

Acronyms

This section provides a listing of acronyms and abbreviations used throughout this electronic service manual.

- AED – Automated External Defibrillator
- BTE – Biphasic Truncated Exponential
- BF – Electrically isolated, external body connection
- bpm – beats per minute
- CPR – Cardiopulmonary Resuscitation
- CPSS – Continuous Patient Surveillance System
- DMM – Digital Multimeter
- ECG – Electrocardiogram
- ESD – Electrostatic Discharge
- LCD – Liquid Crystal Display
- LED – Light Emitting Diode
- MDS – Monophasic Damped Sine
- NSR – Normal Sinus Rhythm
- PC – Personal Computer
- PCB – Printed Circuit Board
- PIP – Performance Inspection Procedure
- QRS – Refers to portions of the ECG waveform
- TCP – Test and Calibration Procedure
- UUT – Unit Under Test
- VF – Ventricular Fibrillation

Safety

The Safety section describes the safety conventions, terms, and symbols used in this electronic service manual or on the LIFEPAK 500 AED. The information is intended to alert service personnel to recommended precautions in the care, use, and handling of this specialized medical device.

Terms

General Warnings and Cautions

Symbols

Terms

Certain terms are used in this electronic service manual or on the equipment. Familiarize yourself with their definitions and significance.

Danger: Immediate hazards that will result in serious personal injury or death.

Warning: Hazards or unsafe practices that could result in serious personal injury or death.

Caution: Hazards or unsafe practices that could result in minor personal injury or product/property damage.

Note: Points of particular interest for more efficient or convenient AED operation; additional information or explanation concerning the subject under discussion.

General Warnings and Cautions

This section contains general warnings and cautions. Keep these warnings and cautions in mind when working with the LIFEPAK 500 AED. Other, more specific warnings and cautions appear throughout this electronic service manual.

WARNINGS!

Possible fire or explosion. Do not use this AED in the presence of flammable gases or anesthetics. Use care when operating this AED close to oxygen sources (such as bag-valve-mask devices or ventilator tubing).

Shock or fire hazard. Do not immerse any portion of this AED in water or other fluids. Avoid spilling any fluids on the AED or accessories. If the AED is ever immersed in water or other fluids, remove the battery until the unit can be serviced.

Patient hazard. Do not mount the AED directly above patient. Place the AED in a location where it cannot harm the patient should it fall from its shelf or other mount.

Shock or fire hazard. Equipment or accessories improperly interconnected to each other can be a source of ignition or cause a shock. Make sure that all equipment is interconnected safely.

General Warnings and Cautions

WARNING!

Shock hazard. Servicing of this AED must be performed by properly trained individuals. This AED may retain potentially lethal charges accessible inside the AED at any time–even when off. Follow procedures carefully for discharging the Energy Storage Capacitor and disabling the Auto Battery Test.

CAUTIONS!

Possible AED damage. This AED may be damaged by mechanical/physical abuse (for example: immersion in water, drop exceeding 30 inches with carrying case, drop exceeding 18 inches without carrying case).

Possible component damage. Do not mount the AED near vibration sources such as engine struts and landing gear.

Possible AED damage. Broken or frayed wires, or loose snap fittings may cause interference or loss of signal. Pay particular attention to the point at which the wires enter the terminals. Repeated flexing at these points eventually causes the wire strands to break. Perform frequent electrical and visual inspections of cables and wires.

Symbols

The following list includes symbols that may be used in this electronic service manual or on various configurations of the LIFEPAK 500 AED and accessories. Some of these symbols may not be relevant to your AED or in every country.

Defibrillation protected, type BF patient connection

Attention, consult accompanying documents

Warning, high voltage

Biphasic defibrillation shock

Data cable: to printer

Data cable: to modem

Buttons for setting the clock and options and transferring data

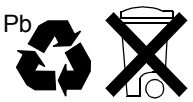
Type BF patient connection

Indicator: AED requires service

Symbols

Indicator: steady illumination—battery is low, replace battery; flashing—replace battery immediately

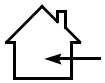
Static Sensitive Device (SSD)



Sealed lead-acid rechargeable battery: recycle battery

Battery charger: green LED indicates power is on

Battery charger: battery is charging; amber LED indicates fast charge, green LED indicates trickle charge



Indoor use only

Safety class II equipment (reinforced insulation)

Data cable: to PC

Product Description

The LIFEPAK® 500 automated external defibrillator (AED) is a portable, battery-powered therapeutic medical device that analyzes the electrocardiographic (ECG) signal of a patient, interprets the indications, advises the operator, and delivers defibrillation therapy. The LIFEPAK 500 AED records an event log, fault code log, system self-test log, ECG signal channel, and the impedance channel for analysis and record keeping. If the LIFEPAK 500 AED detects a shockable cardiac arrhythmia, it enables the operator to deliver a brief, high-energy pulse of electricity to the heart of the patient. The LIFEPAK 500 AED delivers energy through self-adhesive, disposable defibrillation electrodes. Internal circuitry continuously measures the impedance between the electrodes and allows defibrillation only when the defibrillation electrodes are attached to the patient. Advanced arrhythmia analysis controls the critical shock/non-shock decisions.

Physical Description and Features

System Context Diagram

Functional Description

Physical Description and Features

Main Components

The common subassemblies of the LIFEPAK 500 AED are a double-sided, surface-mount Main printed circuit board (PCB), a two-line, 20-character, dot matrix Liquid Crystal Display (LCD), a battery, a QUIK-COMBO™ patient connector serial port, and associated labels, wiring, and hardware.

Monophasic and Biphasic Versions

There are two major models of the LIFEPAK 500 AED, differing in the defibrillation pulse they generate. The LIFEPAK 500 Monophasic AED uses an Energy Storage Capacitor and a wave shaping inductor to deliver a monophasic (Edmark) defibrillation pulse. The LIFEPAK 500 Biphasic AED uses different high-voltage wave shaping components to deliver a biphasic truncated exponential (BTE) defibrillation pulse.

Attribute	LIFEPAK 500 Monophasic AED	LIFEPAK 500 Biphasic AED
Available Energies (joules)[1]	**SHOCK 1**—200 **SHOCK 2**—200 or 300 **SHOCK 3**—360	**SHOCK 1**—200[2] **SHOCK 2**—200 to 300[3], default 300 **SHOCK 3**—200 to 325[3], 360, default 360
Waveform Generation	Wave shaping inductor	Inductive resistor and biphasic PCB

1. Successive shocks are always at greater or equal energy level.
2. U.S. domestic units only. International units 150 to 200 joules; range is inclusive; increment is 25 joules.
3. Range is inclusive; increment is 25 joules.

Physical Description and Features

Options

These options are available on both the LIFEPAK 500 Monophasic AED and LIFEPAK 500 Biphasic AED.

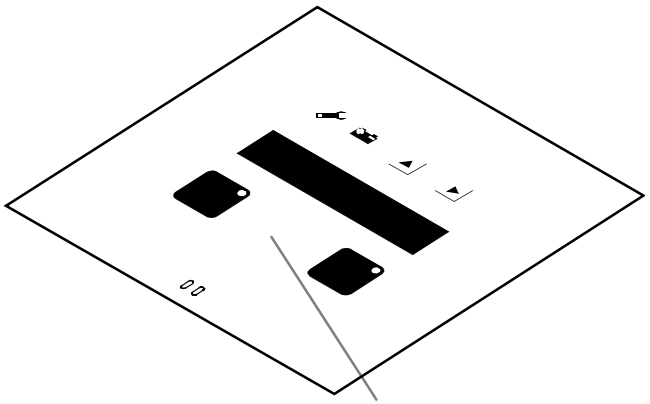
Feature/Function Options

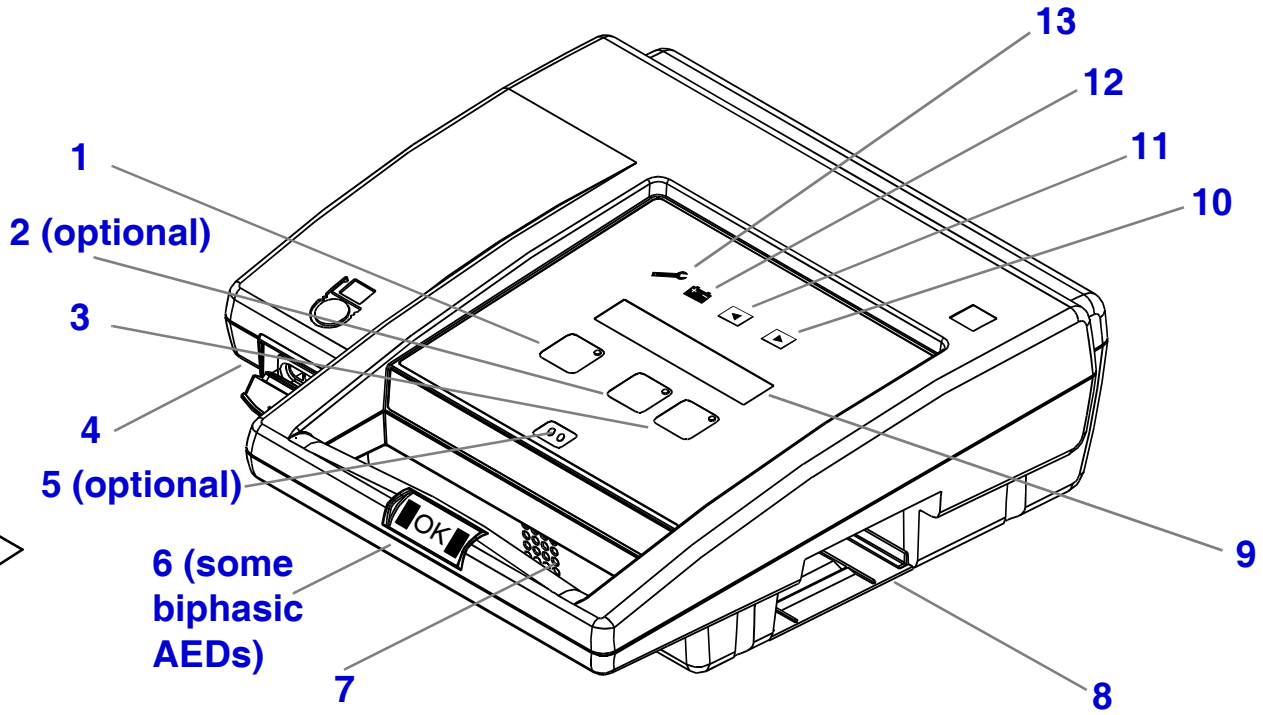
Analyze Mode	**Analyze Button**—auto or manual analyze	**Auto Analyze**—auto analyze only (uses Auto Analyze 2 mode—see **Operating Instructions**)[1]
Audio Recording	**Voice**—storage of audio from event scene[2]	**No voice**—no storage of scene audio

1. "2-button" models have a blank overlay key, called the "menu" key, in place of the ANALYZE key found on 3-button models. This key is for use in Setup and Service modes. Throughout this service manual, the reference "ANALYZE (or Menu) key" indicates a setup or service-mode use of this key.
2. In voice models, audio recording is selectable (factory default is ON). There is a Setup mode function to turn recording off. Turning recording off frees memory for increased ECG storage capacity.

Physical Description and Features

For information on any of the numbered LIFEPAK 500 AED controls, indicators, and connectors shown below, click on a number.





14 (optional)

Physical Description and Features

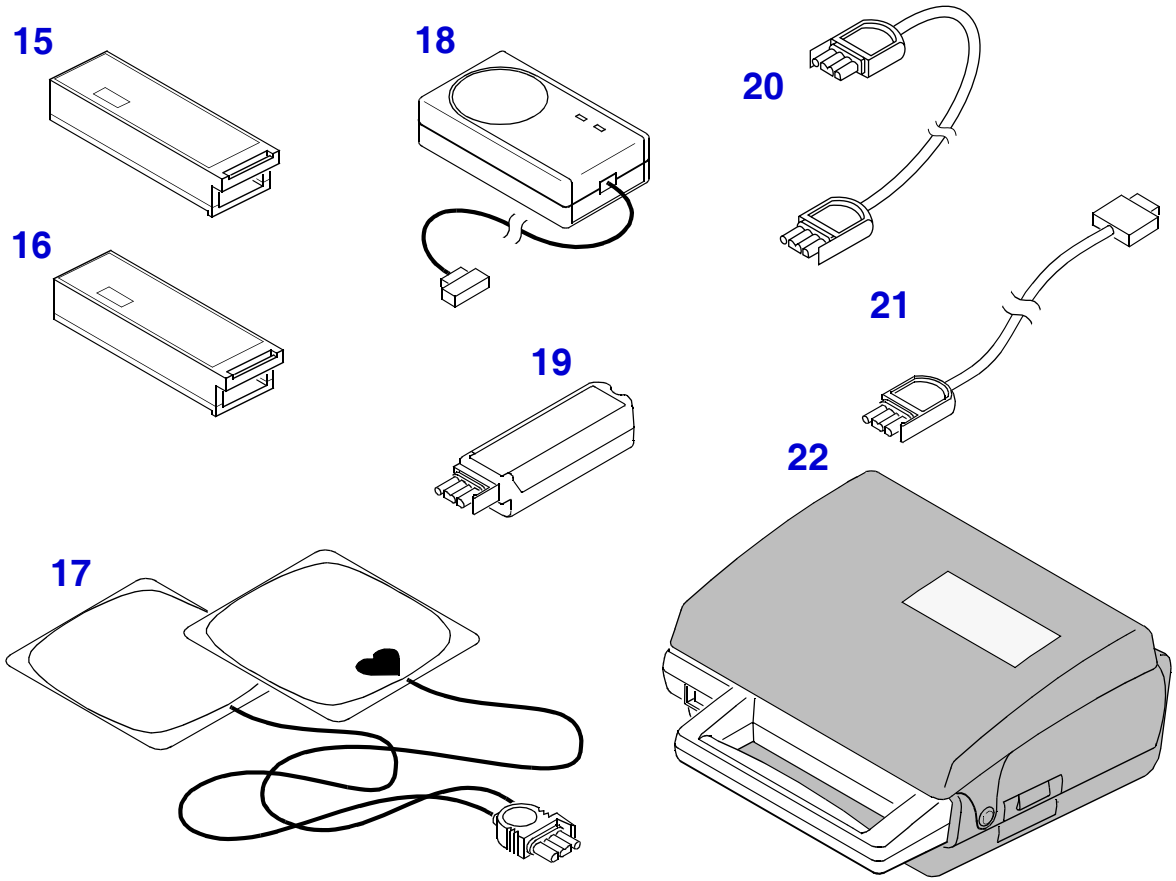
Number	Description
1	The green ON/OFF key turns the power on or off. The LED is lit whenever the AED is on.
2 (optional)	The yellow ANALYZE key begins analysis of the patient's ECG rhythm. The LED is lit while the AED analyzes the rhythm. The LED flashes to prompt the operator to press ANALYZE (3-button units only).
3	The orange SHOCK key delivers energy. The LED flashes to prompt the operator to press SHOCK when the AED is fully charged.
4	The patient connector allows connection to the following: ■ QUICK-COMBO™ or FAST-PATCH® electrodes ■ Cables for connection to a printer, computer, or modem ■ Test load for testing ■ Patient simulator ■ Connection to another unit for setup transfer
5 (optional)	The microphone allows input for audio recording (voice-recording models only).
6 (optional—Biphasic AED)	The READINESS Display presents the same information as the SERVICE (13) and BATTERY (12) indicators for edge-on viewing.

Physical Description and Features

Number	Description
7	The speaker provides audio voice prompts and tones.
8	The battery compartment accommodates a single removable battery pak that provides power for the AED.
9	The Liquid Crystal Display (LCD) provides operating messages on two 20-character lines.
10	The RIGHT ARROW key is used to set the clock, transfer data, and select options.
11	The UP ARROW KEY is used to set the clock, transfer data, and select options.
12	The LOW BATTERY indicator is a red backlit icon that indicates the AED battery is low. If the indicator is lit and the AED displays the **LOW BATTERY** message, the battery is low. If the indicator flashes on and off and the AED displays the **REPLACE BATTERY** message, the battery is very low. Replace the battery immediately.
13	The SERVICE indicator is a red backlit icon that indicates the AED requires service by authorized service personnel.
14 (optional)	The blank “menu” key allows a change of setup options in units without an ANALYZE key.

Physical Description and Features

For information on any of the components shown below, click the component number.

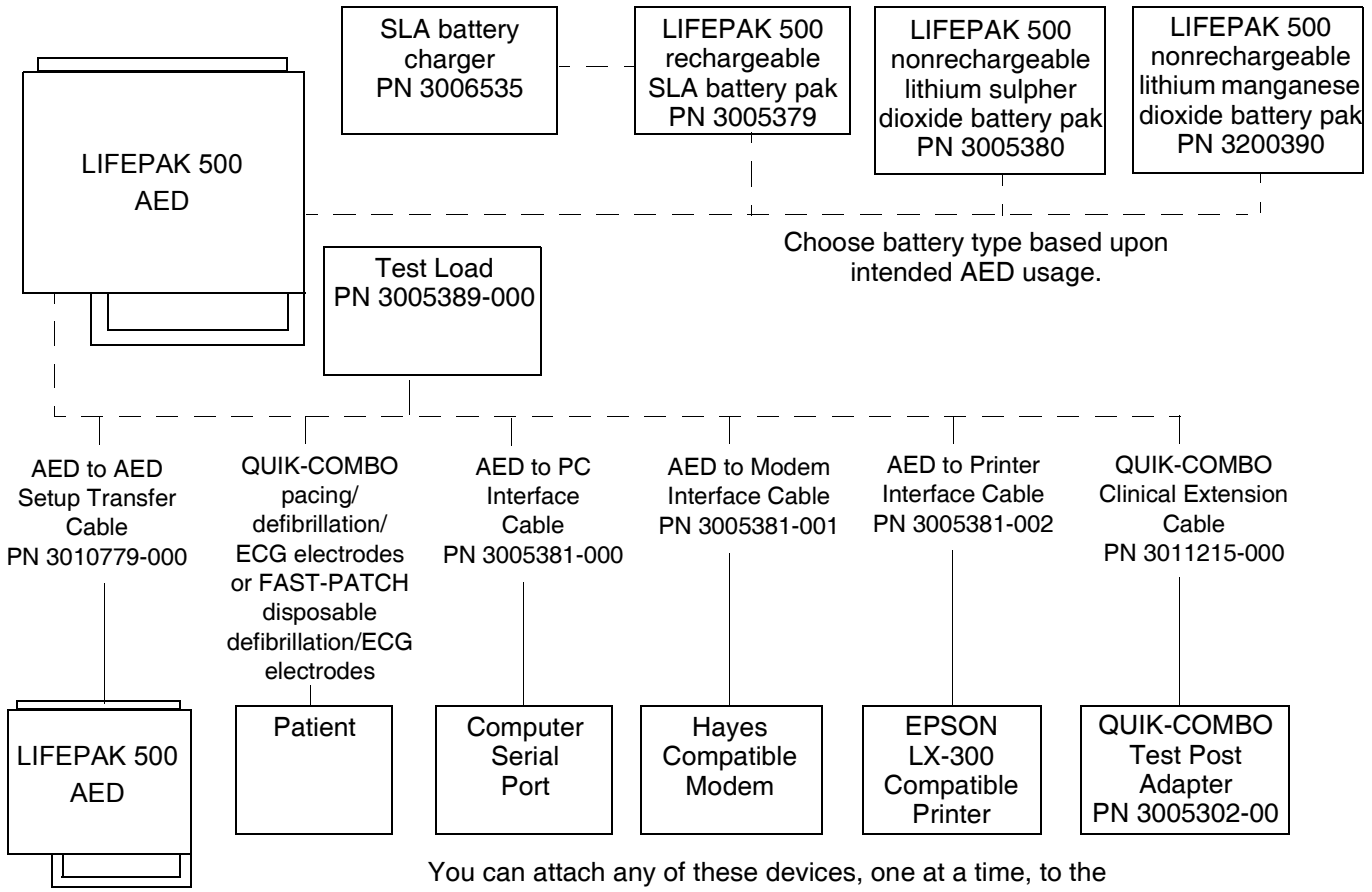


Physical Description and Features

Number	Description
15	The LIFEPAK 500 nonrechargeable lithium battery pak provides power for the LIFEPAK 500 AED.
16	The LIFEPAK 500 rechargeable SLA battery pak provides power for the LIFEPAK 500 AED. The SLA (Sealed Lead-Acid) battery pak is recharged by the battery charger (18).
17	The QUIK-COMBO pacing/defibrillation/ECG electrodes (with the REDI-PAK preconnect system) enable delivery of therapy to the patient. Connect the electrodes to the cable connector on the AED.
18	The battery charger provides power to recharge the rechargeable SLA battery pak. Order appropriate power cord separately.
19	The test load provides an external test load for the AED. Connect the test load to the cable connector on the AED.
20	The Setup Transfer Cable connects two units in order to transmit the current state of setup options from one unit to the other.
21	The depicted data cable is one of three available. The data cables allow transfer of data from the AED to a computer, modem, or printer. The data cables plug into the cable connector on the AED.
22	The carrying case helps protect the AED and provides storage for the electrodes.

System Context Diagram

The system context diagram shows you how the LIFEPAK 500 AED connects to a variety of devices, including the battery paks, the PC interface cable, the Setup Transfer Cable, and the QUIK-COMBO pacing/defibrillation/ECG electrodes and FAST-PATCH electrodes.



Functional Description

The LIFEPAK 500 AED is a portable, battery-powered therapeutic medical device. It consists of the following components:

- Main PCB — A printed circuit board that controls AED functions including ECG signal processing, mode control, rhythm and motion analysis, Energy Storage Capacitor charging, impedance sensing, voice prompting, audio recording capability (except models without scene audio feature), and waveform storage.
- Biphasic PCB (LIFEPAK 500 Biphasic AED only) — A circuit board that generates the biphasic waveform.
- Inductive Resistor (LIFEPAK 500 Biphasic AED only) — A resistor that conditions the Energy Storage Capacitor output for the wave generator/ regulator circuit on the biphasic board.
- Wave-Shaping Inductor (LIFEPAK 500 Monophasic AED only) — An inductor used to modify the Energy Storage Capacitor waveform in the LIFEPAK 500 Monophasic AED. The inductor converts the waveform into the proper output waveform.
- Transfer Relay — (LIFEPAK 500 Biphasic AED): Two relays mounted on the Main PCB that routes current from the energy storage capacitor. (LIFEPAK 500 Monophasic AED): One relay mounted on the Main PCB that routes current from the energy storage capacitor.
- Energy Storage Capacitor — A metallized film capacitor used for energy storage.

Functional Description

- Patient Connector — A port used for patient connection, data communications, and unit testing.
- Keypad — Function keys (ON/OFF, ANALYZE [in 2-button units, blank “menu” key], SHOCK, UP ARROW, and RIGHT ARROW) that enable operator input. The UP ARROW and RIGHT ARROW keys are used for Time-of-Day Clock setup, Service Mode, and Data Transfer Mode. ANALYZE is used manually to initiate patient evaluation (3-button models only). The SHOCK key is used to deliver defibrillation energy. Combinations of these keys are used to place the AED in various operating modes.
- LCD — A two-line, 20-character, dot matrix LCD used to display operator prompts, system status messages, and AED configuration information.
- Readiness Display — A 3-field LCD used to present Service and Battery indicators’ information for edge-on viewing when the AED is secured in a stationary mount (biphasic models only).
- Speaker — Used by the AED to annunciate voice prompts and tones.
- Microphone — Part of the Main PCB, the microphone picks up scene audio data, such as operator remarks, and AED voice prompts or tones for inclusion in the patient record (scene-audio recording models only).

Operating Instructions

The LIFEPAK 500 AED Operating Instructions familiarize the operator with basic AED functions and identify LIFEPAK 500 AED controls, indicators, and connectors. The LIFEPAK 500 AED Setup Instructions document the various setup options and their uses. Qualified service personnel must consult the LIFEPAK 500 AED **Operating Instructions**, the LIFEPAK 500 AED **Setup Instructions**, and this LIFEPAK 500 AED electronic service manual for a complete understanding of the use and maintenance of the AED.

WARNINGS!

Possible improper AED performance. Use only Physio-Control QUIK-COMBO electrodes and batteries mentioned in this electronic service manual. Substitution of non-Physio-Control electrodes or batteries may cause the AED to operate improperly.

Possible defibrillator shutdown. Always have access to a spare, fully charged, properly maintained battery. Immediately replace the battery when the AED displays the LOW BATTERY or REPLACE BATTERY warning.

Possible loss of power during patient care. Using an improperly maintained battery to power the LIFEPAK 500 AED may cause premature power loss. Use the LIFEPAK 500 AED battery charger to charge the LIFEPAK 500 rechargeable battery pak.

Modes of Operation

This section explains the operating modes of the LIFEPAK 500 AED.

Normal Mode

Setup Options

Setting the Clock

Data Transfer Mode

Transferring Setup Between AEDs

User Test Mode

Auto Test Modes

Auto Battery Test Mode

Service Mode

Computer-Assisted Test Mode

Clear Fault Codes

Normal Mode

The LIFEPAK 500 AED operates in Normal Mode for emergency patient care when the following conditions are met:

- The AED is turned on
- The QUIK-COMBO pacing/defibrillation/ECG electrodes or FAST-PATCH disposable defibrillation/ECG electrodes are properly attached to the patient
- The electrode cable connector is plugged into the AED
- The AED is not in Service or Setup Mode

Setup Options

The LIFEPAK 500 AED provides two types of setup options: those that are user-accessible and those reserved for qualified service personnel via the **Service Mode**. With the following setup options, you can define user-accessible operating features for the LIFEPAK 500 AED:

- Device ID
- Modem phone number
- Modem selection
- Modem initialization string
- Energy sequence
- Energy protocol
- Display energy
- Auto analyze
- CPR time 1
- CPR time 2
- CPSS during CPR
- Motion Detection
- Asystole Detector
- Audio recording (only included if optional scene audio recording feature is installed)
- Paper size
- Incident ID
- Transfer setup

Click **Setup Options** for details in the LIFEPAK 500 AED Setup Instructions. With the Setup Cable, PN 3010779-000, you can transfer setup option values from one LIFEPAK 500 AED to another. Click **Transferring Setup Between AEDs** for instructions.

Setting the Clock

24MAY98	12:37:55

To change the date and time:

1. Unplug all components connected to the LIFEPAK 500 AED patient connector.
2. Turn on the AED. (Be sure the AED has been off for at least 60 seconds.)
3. While the power is on and the AED is not connected to a patient or a simulator, press the UP ARROW or RIGHT ARROW key. The AED displays the date and time setting. The hour blinks on and off, indicating that the number can be changed.
4. To change the displayed value:
   - Press the UP ARROW key to increase the value.
   - Press the RIGHT ARROW key to advance to the next field.
5. Repeat Step 4 as needed to set the minutes, seconds, day, month, and year.

Note: To reset the seconds value to zero, press the UP ARROW key once. If the value is less than 30 when reset, the minutes value stays the same. If the seconds value is greater than 30 seconds when reset, the minutes value increases by one.

6. After the date and time are set, press ON/OFF to turn off the AED.

Data Transfer Mode

Incident Scene Review

In Data Transfer Mode, the LIFEPAK 500 AED can accurately re-create an incident scene on a remote computer running the QUIK-VIEW™ 500 data review program or the CODE-STAT™ data management system. The AED enables simultaneous playback of digitally recorded audio (units with optional voice only) and continuous patient ECG. These data review programs support synchronized audio and ECG playback. For more information about data transfer, click **Sending Data to a Computer by Direct Connection** for details in the LIFEPAK 500 Operating Instructions.

System Requirements

- PC-compatible 75 MHz Pentium, minimum
- 16 MB memory (RAM), minimum
- 16550 serial communications chip
- 3.5-inch 1.4 MB floppy disk drive
- VGA color graphics display (640 × 480 pixel resolution), minimum
- 2-button mouse/track ball
- Windows 95, Windows 98, or Windows 2000 (for audio playback) or Windows 3.1 (without audio playback)
- Additional equipment such as a printer, modem, sound card, or speakers

Data Transfer Mode

Patient Data Management

In Data Transfer Mode, the LIFEPAK 500 AED uses the DATA TRANSFER™ 500 information management program to manage patient data by downloading it directly to a printer, modem, or personal computer. The DATA TRANSFER 500 information management program generates and prints patient reports, including CODE SUMMARY critical event records. The DATA TRANSFER 500 information management program is compatible with the CODE-STAT data management system and the QUIK-VIEW 500 data review program, enabling system-wide analysis.

System Requirements

- PC-compatible 33 MHz 80386-DX, minimum
- 4 MB memory (RAM), minimum
- 16550 serial communications chip
- 3.5-inch 1.4 MB floppy disk drive
- VGA color graphics display (640 X 480 pixel resolution), minimum
- 2-button mouse/track ball
- Windows 3.1, Windows 95, or Windows 98
- Additional equipment such as a printer, modem, or fax/modem

Transferring Setup Between AEDs

Transferring setup is a time-saving way to assign the same setup to more than one LIFEPAK 500 AED. The sending and receiving AEDs must be of the same key configuration (3-button or 2-button) and the same defibrillation waveform configuration (monophasic or biphasic) and both must be either voice or non-voice recording type units. To transfer the setup, click on **Transfer Setup**.

Note: The transfer setup option became available with version 4.2 LIFEPAK 500 Monophasic AED operating system software and is available with all versions of the LIFEPAK 500 Biphasic AED operating system software.

User Test Mode

In User Test Mode, the LIFEPAK 500 AED can perform low energy test discharges with an external test load. The External Test Load Test checks the AED charging circuits and the operator's response during a typical ECG analysis and charging cycle. During this test, the AED charges for a low energy test shock. The usual messages and audio prompts are provided. For more information about the External Test Load Test, click on **Auto Tests** to jump to the LIFEPAK 500 Operating Instructions.

CAUTION!

Possible battery depletion. Do not leave the LIFEPAK 500 (with s/w 4.0) connected to a simulator or test load overnight. At the time of the daily Auto Test, the AED will remain on and drain the battery until manually turned off or until the battery is depleted. Always disconnect the AED from the simulator when not in use.

Auto Test Modes

The LIFEPAK 500 AED conducts automatic tests to detect problems that may affect AED performance.

Power-On Self-Test

Whenever the AED is turned off for at least 60 seconds and then turned on, the AED performs a cold start. During the cold start, the AED performs self-tests of the internal electrical components and circuits to ensure that they are working properly. During the Power-On Self-Test, the AED displays the following messages:

MEDTRONIC
PHYSIO-CONTROL c2000

BATTERY OK
SELF-TEST XX.X

Note: The BATTERY OK message may not appear every time the unit is powered on. If the AED does not indicate a low or replace battery condition, the battery is fit for use. The AED displays the LOW BATTERY message when the battery will provide at least 11 shocks for a nonrechargeable lithium battery, or at least 6 shocks for a rechargeable battery. The AED displays the REPLACE BATTERY message when the battery will provide 3 or fewer shocks.

Auto Test Modes

Auto Tests

The AED periodically performs Daily Auto Tests and Extended Auto Tests.

If the AED detects a problem during an auto test that requires service but does not prevent AED use, the AED displays the service indicator and, some biphasic devices, the Readiness Display will have the service wrench displayed since the fault first appeared in the unit.

If the AED detects a problem during an auto test that requires immediate service, the service indicator flashes and the AED activates an intermittent audible alarm, except in biphasic units that contain the Readiness Display.

Note: It is important to store the AED at the operating temperature range of 0°–50°C (32°–122°F) when the battery is installed. If the ambient temperature is outside of this range, the Auto Test may erroneously detect and report a problem.

Auto Test Modes

Daily Auto Test

Every day at 0300 (3:00 a.m.) the AED automatically performs the following functions:

- Turns itself on
- Performs the extended self-test
- Stores the results of the self-test in the Test Log
- Turns itself off

If the AED is already on at 0300, the Daily Auto Test will not be performed. If you turn on the AED while the Daily Auto Test is in progress, the test will be terminated and the AED will function normally.

WARNING! (LIFEPAK 500 Monophasic AED with Operating System Software Version 4.0)

Possible loss of power during patient care. Do not leave an external test load or patient simulator connected to the AED when not in use. The AED enters Normal Mode instead of performing a Daily Auto Test if it is connected to a patient, an external test load, or a patient simulator at the time of test initialization. The AED will remain on and continue to drain the battery until it is turned off or until the battery is depleted.

Auto Test Modes

Extended Auto Test

The AED automatically turns on and performs the following Extended Auto Test on the first Monday morning of the month at 0300 (3:00 a.m.):

- The standard Daily Auto Test
- Additional testing of front-end circuitry
- (LIFEPAK 500 Biphasic AED only): Additional relay testing

The Daily Auto Test includes charging the Energy Storage Capacitor to about 50 joules and discharging it internally (this energy is not available at the patient cable connector). The Daily Auto Test is not performed if the AED is already on at 0300 or if the battery is not installed; if the AED ON/OFF key is pressed while the Daily Auto Test is in progress, the test is halted and the AED is available for normal operation.

WARNING! (LIFEPAK 500 Monophasic AED with Operating System Software Version 4.0)

Possible loss of power during patient care. Do not leave an external test load or patient simulator connected to the AED when not in use. The AED enters Normal Mode instead of performing a Daily Auto Test if it is connected to a patient, an external test load, or a patient simulator at the time of test initialization. The AED will remain on and continue to drain the battery until it is turned off or until the battery is depleted.

Auto Battery Test Mode

The AED performs an automatic battery test routinely during Auto Test (every week for an SLA battery and every two weeks for a lithium battery), and under most circumstances when you replace the battery and then turn on the unit. In Auto Battery Test Mode, the AED charges the Energy Storage Capacitor while monitoring battery voltage to determine the remaining battery capacity. The Auto Battery Test renders one of the following advisories of battery status:

- **BATTERY OK**
- Battery indicator illuminated steadily and the **LOW BATTERY** message displayed. At the time the low battery indicator first comes on, remaining battery capacity is sufficient to deliver 11 or more shocks with a nonrechargeable battery or 6 or more shocks with a rechargeable battery.
- Battery indicator flashes on and off and the **REPLACE BATTERY** message is displayed. Remaining battery capacity is sufficient to deliver 3 or more shocks. The battery is very low. Replace the battery immediately.

Auto Battery Test Mode

WARNINGS!

Possible loss of power during patient care. Auto Battery Test messages are valid for properly maintained batteries. Improper maintenance of batteries may cause inaccurate Auto Battery Test results.

Shock hazard. With Auto Battery Test enabled, the AED automatically charges the Energy Storage Capacitor upon power up after you install a new battery, during Auto Test (every week for an SLA battery and every 2 weeks for a lithium battery), and every 20 minutes of cumulative on time. Use the Service Mode to disable Auto Battery Test Mode before disassembling the case.

The Auto Battery Test may not occur under some circumstances. For example, if the Energy Storage Capacitor is already charged to a level above the maximum battery test threshold (150 J), the Auto Battery Test will not occur. If this is the case, the **BATTERY OK** message will not appear when the AED is turned on and the battery indicator will not illuminate.

Auto Battery Test Mode

To force the LIFEPAK 500 AED to perform an Auto Battery Test:

1. Perform a **Test Load Test**, as described in the LIFEPAK 500 AED Operating Instructions, to dissipate any capacitor remnant charge.
2. Turn off the AED and remove the battery.
3. Install the battery that you want to test. Wait at least one minute before turning the AED back on.
4. Turn on the AED and wait until it displays the **BATTERY OK** message and then displays **CONNECT ELECTRODES**. At this point, the AED will have performed an Auto Battery Test. The **BATTERY OK** message may not appear every time the unit is powered on. As long as the battery indicator does not indicate either a low battery or replace battery condition, you may proceed.
5. Turn off the AED.

Service Mode

Service Mode functions shown on the front panel allow qualified personnel to:

- Turn Auto Battery Test on or off
- Review and clear the recorded fault codes
- Review and clear the shock counters
- Review and clear the hour meter
- Set the AED serial number
- Set the AED dash number (LIFEPAK 500 Monophasic AED, operating system software version 4.42 and earlier only)
- Review AED prompts
- Review AED tones
- Adjust LCD contrast (LIFEPAK 500 Monophasic AED, operating system software version 4.42 and earlier only)

WARNING!

Shock hazard. Follow the procedures carefully for discharging the Energy Storage Capacitor whenever opening the LIFEPAK 500 AED case. With Auto Battery Test enabled, the AED automatically charges to 50 J above any capacitor remnant charge when powered up in the Service Mode.

Service Mode

To place the LIFEPAK 500 AED in Service Mode:

1. Unplug all components connected to the LIFEPAK 500 AED Patient Connector.
2. Simultaneously hold down the UP ARROW, RIGHT ARROW, and SHOCK keys when you turn on the AED.
3. When prompted to enter a passcode, enter the passcode key sequence—UP, ANALYZE (or MENU), RIGHT, RIGHT, SHOCK, ANALYZE (or MENU).
4. If a calibration meter is connected when the passcode is entered, the AED will go into Energy Calibration Mode.

WARNING!

Shock hazard. Use the Service Mode to disable Auto Battery Test Mode before disassembling the case. With Auto Battery Test enabled, the AED automatically charges to 50 joules above any capacitor remnant charge upon power up after you install a new battery.

AUTO BATTERY TEST ON/OFF

5. If a calibration meter is not connected when the passcode is entered, press the ANALYZE (or MENU) key to advance to the **AUTO BATTERY TEST** screen. The current selection, **ON**, flashes. Press the UP ARROW key to toggle between selections (ON/OFF).

Service Mode

FAULT CODES
CODE DDMMMYY HH:MM

6. Press the ANALYZE (or MENU) key to advance to the **FAULT CODES** screen. Press the UP ARROW key to scroll through the recorded fault codes in sequence. **END** signifies there are no more fault codes to review. If there are no fault codes present, the **FAULT CODES** screen displays **NONE**. Click **Clear Fault Codes** for more information.

CLEAR FAULT CODES?
YES/NO

7. The **CLEAR FAULT CODES** screen only displays when fault codes are present. The current selection, **NO**, flashes. Press the UP ARROW key to toggle between selections (YES/NO). To complete this procedure, press the ANALYZE (or MENU) key.

SHOCK COUNTER
XXXXX/YYYYY ZZZJ

8. Press the ANALYZE (or MENU) key to advance to the **SHOCK COUNTER** screen. This screen displays the number of shocks the AED has delivered since the last time the shock counter was reset and the number of shocks the AED has delivered since it was built. The shock counter screen displays the number of recorded shocks for each of four energy settings (360J, 300J, 200J, and 5J). **XXXXX** represents the number of shocks since the last counter reset, **YYYYY** represents the number of shocks since the unit was built, and **ZZZ** represents the energy setting. The 5J energy setting is for test load tests only. Press the UP ARROW key to scroll through the shocks recorded for each of the energy settings.

Service Mode

CLEAR SHOCK COUNTS?
___

9. Press the ANALYZE (or MENU) key to advance to the **CLEAR SHOCK COUNTS?** screen. The current selection, **NO**, flashes. Press the UP ARROW key to toggle between selections (YES/NO). To complete this procedure, press the ANALYZE (or MENU) key.

HOURS
XXXXX/YYYYY

10. Press the ANALYZE (or MENU) key to advance to the **HOURS** screen. This screen displays the number of hours the AED has been in service since it was built and since the last time the hours counter was reset (**XXXXX** represents the number of hours since the last hour meter reset and **YYYYY** represents the number of hours since the unit was built).

CLEAR HOUR METER?
YES/NO

11. Press the ANALYZE (or MENU) key to advance to the **CLEAR HOUR METER?** screen. The current selection, **NO**, flashes. Press the UP ARROW key to toggle between selections (YES/NO). To complete this procedure, press the ANALYZE (or MENU) key.

SERIAL NUMBER
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

12. Press the ANALYZE (or MENU) key to advance to the **SERIAL NUMBER** screen. This screen displays a flashing underscore followed by a field of up to 17 additional characters. Press the UP ARROW key to scroll through the entire character set. Press the RIGHT ARROW key to scroll through the 18 positions in the serial number character field.

13. (LIFEPAK 500 Monophasic AED, operating system 4.42 or earlier only): Press the ANALYZE (or MENU) key to advance to the **DASH NUMBER** screen. Record the dash number.

Service Mode

PROMPT REVIEW

14. Press the ANALYZE (or MENU) key to advance to the **PROMPT REVIEW** screen. Press the UP ARROW key to scroll through all of the AED screen messages and voice prompts. For a complete listing of screen messages and voice prompts, refer to the LIFEPAK 500 AED **Operating Instructions**.

TONE REVIEW
_

15. Press the ANALYZE (or MENU) key to advance to the **TONE REVIEW** screen. Press the UP ARROW key to scroll through all of the AED tones.

CAUTION!

Possible device malfunction. (Monophasic software version 4.42 and earlier): Incorrect adjustment of LCD contrast could affect the LCD's readability at temperature extremes of 0° and 50°C (32° and 122°F). Contact Medtronic Physio-Control for further information.

ADJUST LCD CONTRAST
XXX%

16. **(Monophasic software version 4.42 and earlier):** Press the ANALYZE (or MENU) key to advance to the **ADJUST LCD CONTRAST** screen. Press the UP ARROW key to scroll through available values for LCD contrast (the default value is 60%).

17. Turn power off at any time to exit Service Mode.

    Note: New settings are saved only if the ANALYZE (or MENU) key is pressed after changing an entry. If you press the ANALYZE (or MENU) key after you have exited Service Mode, the display advances to the **AUTO BATTERY TEST** screen again.

Computer-Assisted Test Mode

The Performance Inspection Procedure (PIP) is a closed-case operational evaluation of the LIFEPAK 500 AED comprised of both manual and computer-assisted test procedures. Instructions for executing the manual and computer-assisted portions of the PIP and minimum PC platform requirements are given in the **Performance Inspection Procedure** section of this electronic service manual.

LIFEPAK 500 AED computer-assisted testing accomplishes complex internal test functions while minimizing the need for specialized equipment. The following tests are performed in the computer-assisted portion of the PIP.

- Serial communication function
- Battery sense
- Slow charge rate circuit
- ECG monitoring
- Motion detection
- Alarm Clock Test
- Audio Recording Test
- Power Failure Recovery Test

Computer-Assisted Test Mode

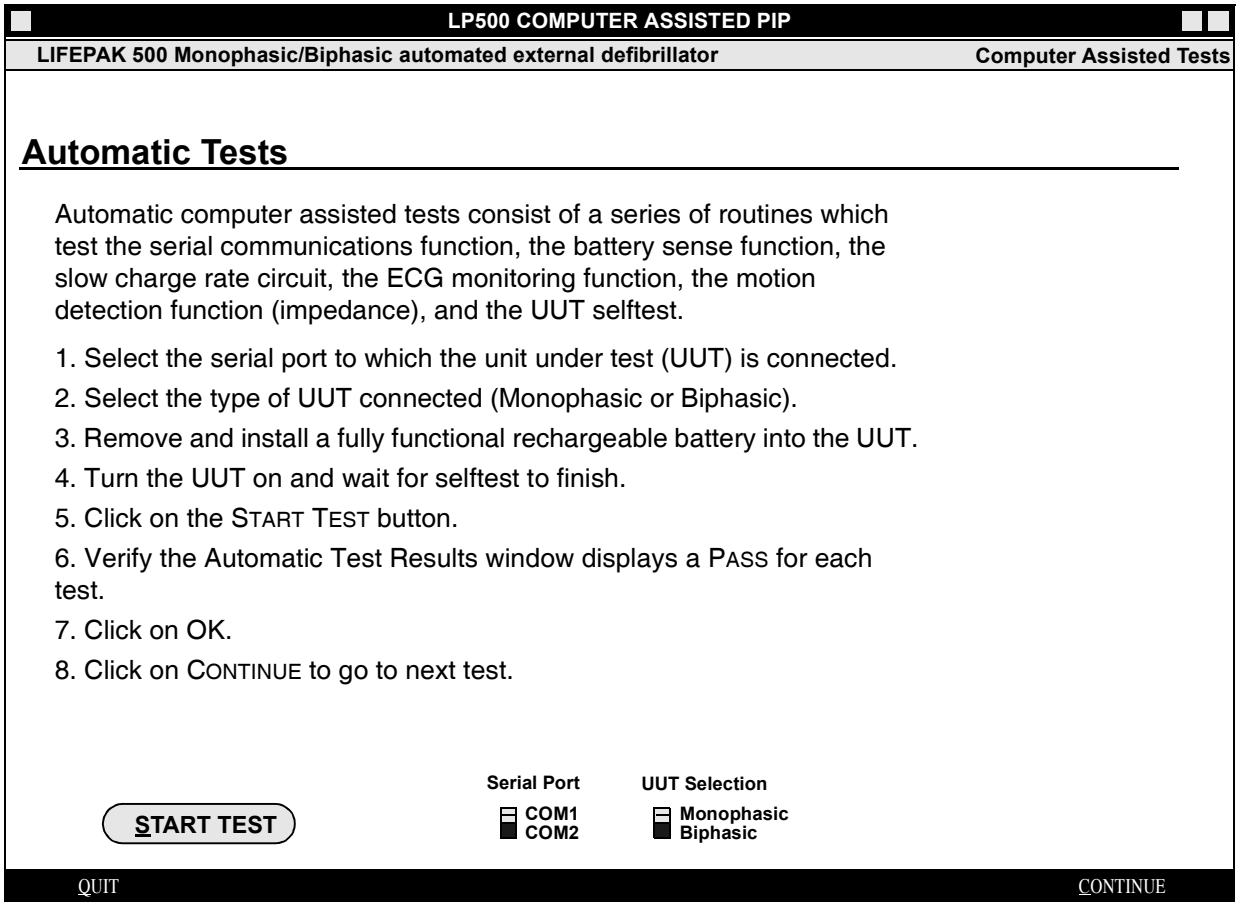
You must install the Computer-Assisted Test program from the LIFEPAK 500 AED Electronic Service Manual CD-ROM onto your local hard disk. To install the Computer-Assisted Test program (*lp500pip.exe*):

1. Use Windows File Manager or Explorer to locate and open the “piptest” folder on this electronic service manual CD-ROM.
2. Double-click on the *setup.exe* icon to launch the installer application.
3. Follow the instructions given on the screen to complete the installation.

   Note: Accept all defaults suggested by the installer for placement of files.
4. The installer creates two subdirectories on your local hard disk:
   - C:\lp500pip contains the following four files:
     - *lp500pip.exe*
     - *pip_gui.uir*
     - *uninst.exe*
     - *uninst.lrm*
   - C:\cvirte contains the following three files:
     - *cvirt4.exe*
     - *Bin (a subdirectory)*
     - *Fonts (a subdirectory)*

Computer-Assisted Test Mode

When you run the Computer-Assisted Test program (*lp500pip.exe*), the first Computer-Assisted Test screen will appear. Follow the instructions presented on the Computer-Assisted Test screens to complete the automatic portion of the Performance Inspection Procedure (PIP).



Clear Fault Codes

To clear fault codes from the fault code log:

1. Unplug all components connected to the LIFEPAK 500 AED patient connector.
2. Place the AED in **Service Mode**.
3. Press the ANALYZE (or MENU) key until the fault codes are displayed.
4. Press the UP ARROW key to scroll through the fault codes until **END** is displayed.
5. Record all of the displayed fault codes and the date/time each occurred.

CLEAR FAULT CODES?
YES/NO

6. Press the ANALYZE (or MENU) key until the **CLEAR FAULT CODES?** screen is displayed.
7. Select **YES** by pressing the UP ARROW key, then press the ANALYZE (or MENU) key.
8. Turn off the AED to exit Service Mode.
9. Turn on the AED and verify that the service indicator is off. If the service indicator remains on, check for new fault codes and make sure the Auto Battery Test option is turned on. The service indicator will light if there are faults in the fault code log or when the Auto Battery Test option is turned off.

Performance Inspection Procedure

The Performance Inspection Procedure (PIP) is a set of manual and computer-assisted test procedures used for an operational closed-case evaluation of the LIFEPAK 500 AED. This section describes the test procedures you will perform to determine if the LIFEPAK 500 AED is operating within the required specifications. Investigate and correct any malfunctions or out-of-tolerance conditions detected during the PIP.

The PIP is comprised of safety and performance tests recommended by AHA/ASHE (American Hospital Association/American Society for Hospital Engineering) *Maintenance Management for Medical Equipment* and International Electrotechnical Commission (IEC) Technical Report 1288-2, *Maintenance of Cardiac Defibrillators-Monitors*.

Perform the PIP as part of a regularly scheduled preventive maintenance routine. Also, perform the PIP after any repair, replacement, or calibration procedure. Print the **Performance Inspection Procedure Checklist** to record the results.

PIP – Scope and Applicability

PIP – Resource Requirements

PIP – Test Equipment Requirements

PIP – Instructions

PIP – Checklist

PIP – Scope and Applicability

The PIP applies to the LIFEPAK 500 AED exclusively. To complete the PIP, you must perform the combination of manual and computer-assisted tests outlined in the **PIP – Instructions** section of this electronic service manual. All PIP tests must be performed from start to finish in the order presented.

Refer to the **PIP – Resource Requirements** for a listing of the necessary qualifications for PIP equipment, test equipment verification, workstation power, and personnel.

Refer to the **PIP – Test Equipment Requirements** for a listing of test equipment, including specifications, required to complete the PIP.

You can print the **PIP – Checklist** and use it to record your results.

PIP – Resource Requirements

This section describes the requirements for PIP equipment, PIP test equipment verification, PIP workstation power, and PIP personnel.

PIP – Equipment

To perform the PIP, you must use the equipment listed in the **PIP – Test Equipment Requirements** table. Although the table lists specific test equipment by manufacturer, test equipment with equivalent specifications may be substituted.

PIP – Test Equipment Verification

All test equipment used to perform the PIP must have a current calibration label. The calibration label must be issued by a certified calibration facility.

PIP – Workstation Power

The ac line power to the workstation used must be connected to a grounded power source.

PIP – Personnel

Service personnel who perform the PIP must be thoroughly familiar with the operation of the LIFEPAK 500 AED and must meet at least one of the following requirements (or the equivalent):

- Associate of Applied Science, with an emphasis in biomedical electronics
- Certificate of Technical Training, with an emphasis in biomedical electronics
- Equivalent biomedical electronics experience

PIP – Test Equipment Requirements

Equipment	Specifications	Manufacturer
Defibrillator analyzer	Power range: 0-450 J Load resistance: 50 Ω ± 1% Accuracy ± 2% +2 J Waveforms: NSR and VF	BIO-TEK® QED-6™
LIFEPAK 500 rechargeable SLA battery pak	Fully charged, properly maintained, no battery fault indications displayed by the AED	Medtronic Physio-Control PN 3005379
Timer (stop-watch)	1-second resolution	
Decade resistance box	Range: 0-500 Ω Resolution: 1 Ω Accuracy: 1%	IET Model RS-200
Safety analyzer	110 or 220 Vac line voltage Current range: 0-1999 μA Current accuracy: 5% of reading or 1 digit (whichever is greater)	Dale Model 600 or 600E
Digital multimeter (DMM)	± 0.03% of reading + 2 digits	Fluke® 8050A

PIP – Test Equipment Requirements

Equipment	Specifications	Manufacturer
Resistor	33 Ω, 5 W (minimum), 10%	
Serial interface cable		Medtronic Physio-Control PN 3005381-000
FAST-PATCH cable — OR— QUIK-COMBO test post adapter with QUIK-COMBO female-to-male clinical extension cable		Medtronic Physio-Control PN 3010699-000 Medtronic Physio-Control PN 3005302-00 Medtronic Physio-Control PN 3011215-000
Computer	486 or Pentium® processor Microsoft® Windows 3.1, 95, or 98 8 MB RAM, 500 MB hard drive CD-ROM drive, 3.5-inch floppy drive 1 Serial 9-pin communication port mouse, keyboard, monitor printer connector	
Printer	300 dpi	

PIP – Instructions

PIP – General Instructions

This section lists the general instructions for performing the Performance Inspection Procedure (PIP).

- Perform the PIP in the presented order.
- Always start the PIP from the beginning of the procedure.
- Print the **Performance Inspection Procedure Checklist** and record your results.

Note: "2-button" models of the LIFEPAK 500 AED have a blank overlay key, called the "menu" key, in place of the ANALYZE key found on 3-button models. This key is for use in Setup and Service modes. Throughout this Performance Inspection Procedure, the reference "ANALYZE (or MENU) key" indicates a service-mode use of this key.

PIP – Physical Inspection

Perform the exterior physical inspection as described below.

1. Inspect all exterior surfaces of the LIFEPAK 500 AED for the following:
   - Damage
   - Excessive wear
   - Improper mechanical function
   - Damaged connectors

PIP – Instructions

PIP – Physical Inspection (continued)

2. Pick up and turn over the AED and listen for loose or rattling hardware. Locate any loose or rattling hardware and tighten or replace it.
3. Inspect the rubber feet on the underside of the lower enclosure. Reinstall or replace rubber feet as necessary.
4. Check for debris or bent, broken, or corroded connectors or pins. Clean or replace damaged components.
5. Inspect the keypanel overlay label for damage, cracks, or separation from the top cover.

PIP – Instructions

PIP – Setup

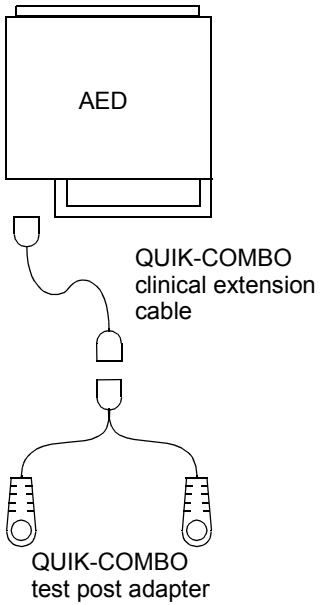
- Before you perform any test procedures, insert a battery that you know is fully functional into the LIFEPAK 500 AED. A fully functional battery is defined as a battery that does not return battery fault indications.
- Verify that the battery clicks into position (listen for an audible click during insertion).

WARNING!

Shock hazard. When discharged during this PIP, the LIFEPAK 500 AED discharges up to 360 J of electrical energy through the defibrillator cable. The Energy Storage Capacitor carries high voltage up to several hours after charging. You must remove the battery and safely discharge the capacitor manually before proceeding to access internal components as described in this PIP. Do not attempt to perform this procedure unless you are thoroughly familiar with the operation of the AED.

PIP – Instructions

PIP – Setup (continued)



- Connect either the FAST-PATCH cable or the QUIK-COMBO cable with test post adapter (as shown at the left) to the AED patient interface connector. **Note:** Do not connect the FAST-PATCH cable or QUIK-COMBO test post adapter to any other equipment, except as directed, during this procedure.

PIP – Instructions

PIP – Power On

Before you perform the PIP Power On Self-Test, make sure the AED has been off for at least 60 seconds. To perform the PIP Power On Self-Test:

1. Turn on the LIFEPAK 500 AED.
2. Verify that all pixels on the LCD are clearly readable and uniform during the LCD test.
3. Verify that the LOW BATTERY and SERVICE indicators flash on briefly.
4. Verify that the ANALYZE (3-button LIFEPAK 500 AED models only) and SHOCK LEDs flash on.
5. Verify that the ON/OFF LED is lit and that the following information is displayed on the LCD:

SELF TEST XX.X

XX:XX
CONNECT ELECTRODES

PIP – Instructions

PIP – Power On (continued)

6. Record the software version that appears after **SELF TEST** on the PIP Checklist.
7. Verify that the audio messages and tones emitting from the AED speaker are clear.
8. Verify that the LOW BATTERY indicator is off.
9. Verify that the CALL SERVICE message is not displayed and that the SERVICE indicator is off.
10. Turn off the AED.
11. (LIFEPAK 500 AED models with Readiness Display only): Turn on the AED again and confirm that the LOW BATTERY and SERVICE indicators in the handle flash on briefly and that the OK message is displayed. Turn off the AED.
12. Record the results on the PIP Checklist.

    Note: If the SERVICE indicator is on, you may have to **clear one or more fault codes** from the fault code log.

PIP – Instructions

PIP – Keyboard Test

To test keyboard functionality:

1. Place the AED in **Service Mode**.
2. Successful entry into the Service Mode indicates that all of the keys work properly.
3. Record the results on the PIP Checklist.

PIP – Auto Battery Test Enabled

1. While in **Service Mode**, enter the passcode to display the **AUTO BATTERY TEST** screen.
2. Verify Auto Battery Test Mode is set to **ON**.
3. Record the results on the PIP Checklist.

PIP – Instructions

PIP – Record Operating Data

SHOCK COUNTER
XXXXX/YYYYY ZZZJ

HOURS
XXXXX/YYYYY

Record the following LIFEPAK 500 AED operating data on the PIP Checklist.

1. While in **Service Mode**, press the ANALYZE (or MENU) key to display the **SHOCK COUNTER** screen. Total the number of shocks for the energy levels since the AED was built (represented by **YYYYY** in the Shock Counter display).
2. Press the ANALYZE (or MENU) key to display the **CLEAR SHOCK COUNTS?** screen. Press the UP ARROW key to select **YES**.
3. Press the ANALYZE (or MENU) key to display the operating **HOURS** since the AED was built (represented by **YYYYY** in the **HOURS** display).
4. Press the ANALYZE (or MENU) key to display the **CLEAR HOUR METER?** screen. Press the UP ARROW key to select **YES**.
5. Press the ANALYZE (or MENU) key to display the **SERIAL NUMBER** screen. Compare the displayed serial number with the serial number on the AED. If they do not match, use the UP ARROW and RIGHT ARROW keys to enter the correct number. Monophasic AED, operating system 4.43 or earlier only: Press the ANALYZE (or MENU) key to display the **DASH NUMBER** screen. Compare the displayed dash number with the dash number on the AED. If they do not match, use the UP ARROW and RIGHT ARROW keys to enter the correct number.
6. Turn off the AED.

PIP – Instructions

PIP – Time and Date

Check the LIFEPAK 500 AED time and date.

1. Turn on the AED.
2. Press the UP ARROW key to check the time and date.
3. Verify that the correct time and date values are displayed on the LCD.

   Note: If the time and date are incorrect, perform the **Clock Set** procedure.
4. Turn off the AED.
5. Record the results on the PIP Checklist.

PIP – Electrode Impedance

Check the relationship between electrode impedances and LCD messages.

1. Connect the AED to the decade resistance box using the QUIK-COMBO test post adapter with the QUIK-COMBO clinical extension cable or FAST-PATCH cable, as shown on the following page.

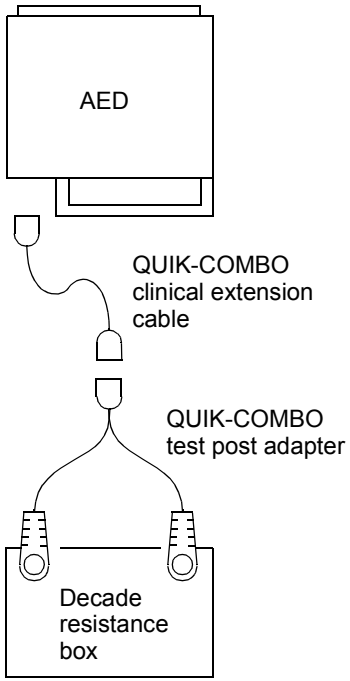
CAUTION!

Possible test equipment damage. Do not defibrillate into the decade resistance box.

2. Turn on the AED.

PIP – Instructions

PIP – Electrode Impedance (continued)



3. Set the decade resistance box to the resistance values listed below.
4. Verify that the AED displays the appropriate messages.

Resistance Value	Message
20 Ω	CONNECT ELECTRODES
38 Ω	3-button models: Push ANALYZE 2-button models: ANALYZING NOW—STAND CLEAR
238 Ω	3-button models: Push ANALYZE 2-button models: ANALYZING NOW—STAND CLEAR—NO SHOCK ADVISED—CHECK FOR PULSE
370 Ω	CONNECT ELECTRODES
OPEN	CONNECT ELECTRODES

5. Turn off the AED.
6. Disconnect the FAST-PATCH cable or QUIK-COMBO test post adapter from the decade resistance box.
7. Record the results on the PIP Checklist.

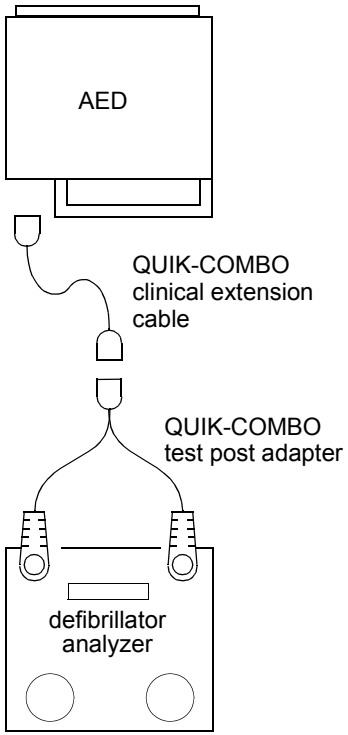
PIP – Instructions

PIP – Electrode Impedance (LIFEPAK 500 Biphasic AED Only)

1. Place the AED in Service Mode. Do not enter the Passcode at this time.
2. When the keypad LCD displays the **ENTER PASSCODE** message, connect the AED to a decade resistance box, set to 225 Ω, using the QUIK-COMBO test post adapter with the QUIK-COMBO clinical extension cable or FAST-PATCH cable.
3. Enter the Service Mode Passcode key sequence.
4. Bypass Part A impedance by pressing the ANALYZE (or MENU) key once.
5. Verify the 225 Ω impedance reading for Part B (on the bottom line of the AED display) is between 213.8 Ω and 236.3 Ω. If the reading is out of range, jump to **Impedance Test (LIFEPAK 500 Biphasic AED only)**.
6. Set the decade resistance box to 50 Ω. Verify the 50 Ω reading for Part B is between 47.5 Ω and 52.5 Ω. If the reading is out of range, jump to **Impedance Test (LIFEPAK 500 Biphasic AED only)**.
7. Record the results on the PIP Checklist.
8. Turn off the AED.

PIP – Instructions

PIP – Energy Output and Charge Time



WARNING!

Shock hazard. Avoid contact with the energy meter. Dangerous voltages will be present on the energy meter electrode plates/posts.

To check the energy output and charge time:

1. Remove the installed battery and insert a battery that you know is fully functional into the LIFEPAK 500 AED. A fully functional battery is defined as a battery that does not return battery fault indications.
2. Place the AED in **Service Mode**. Do not enter the Passcode at this time.
3. When the keypad LCD displays the **ENTER PASSCODE** message, connect the AED to the defibrillator analyzer using the QUIK-COMBO test post adapter with QUICK-COMBO clinical extension cable or FAST-PATCH cable.

PIP – Instructions

PIP – Energy Output and Charge Time (continued)

4. Enter the **Service Mode** Passcode key sequence.

   Note (LIFEPAK **500 Biphasic** AED **only)**: Bypass the Impedance Calibration test by pressing the ANALYZE (or MENU) key three times. This advances the AED to the **CALIBRATE ENERGY** screen. For information on the Impedance Calibration Test, jump to **Impedance Test (LIFEPAK 500 Biphasic AED only)**.

5. Set the defibrillator analyzer to energy, 1000 J scale.

6. Confirm that the AED is displaying the first calibration level on the **CALIBRATE ENERGY** screen. For the LIFEPAK 500 Monophasic AED, the first calibration energy level is 200 J; for the LIFEPAK 500 Biphasic AED, the first calibration energy level is 100 J. Press the ANALYZE (or MENU) key to charge to the selected energy level.

7. While the unit is charging, press and hold down the SHOCK key to discharge the AED as soon as it is fully charged.

PIP – Instructions

PIP – Energy Output and Charge Time (continued)

8. Verify that the defibrillator analyzer indicates the delivered energy is within the acceptable output limits, shown below. Perform the **TCP – Energy Calibration** if the delivered energy falls outside of the acceptable output range.

ENERGY SELECTED (J)	ACCEPTABLE OUTPUT (J)
100 (LIFEPAK 500 Biphasic AED only)	95–105
200 (LIFEPAK 500 Monophasic AED only)	190–210
300 (LIFEPAK 500 Monophasic AED only)	285–315
360	342–378

9. Press the ANALYZE (or MENU) key to retain the current calibration value if the delivered energy falls within the acceptable output range.
10. Record the discharged energy level on the PIP Checklist.
11. Press the UP ARROW key to select the next discharge level. For the LIFEPAK 500 Monophasic AED, the next level is 300 J. For the LIFEPAK 500 Biphasic AED, the next level is 360 J.

PIP – Instructions

PIP – Energy Output and Charge Time (continued)

12. Press the ANALYZE (or MENU) key to charge to the selected energy level.
13. While the AED is charging, press and hold down the SHOCK key to discharge the defibrillator as soon as it is fully charged.
14. Press the ANALYZE (or MENU) key to retain the current calibration value if the delivered energy falls within the acceptable output range.
15. Record the discharged energy level on the PIP Checklist.
16. (LIFEPAK 500 Monophasic AED only): Press the UP ARROW key to select the next energy level, 360 J.
17. Press the ANALYZE (or MENU) key to charge to the selected energy level.
18. While the AED is charging, press and hold down the SHOCK key to discharge the defibrillator as soon as it is fully charged.
19. Press the ANALYZE (or MENU) key to retain the current calibration value if the delivered energy falls within the acceptable output range.
20. Record the discharged energy level on the PIP Checklist.

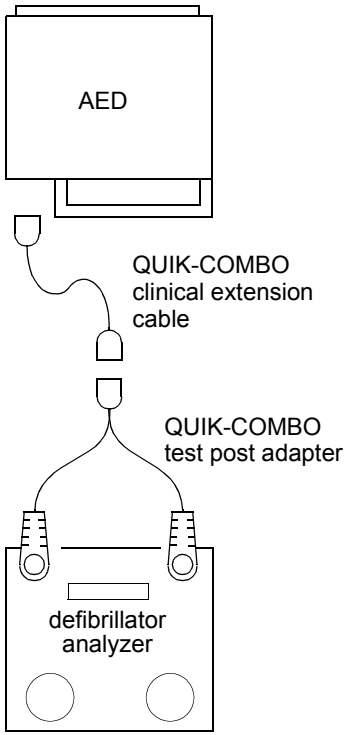
PIP – Instructions

PIP – Energy Output and Charge Time (continued)

21. Press the UP ARROW key to select the energy level for the Charge Time test, 360 J.
22. Simultaneously start the timer and press the ANALYZE (or MENU) key.
23. Stop the timer as soon as the **PUSH TO SHOCK** message appears.
24. Verify that the AED charges to 360 J in 15 seconds or less.
25. Press the SHOCK key to discharge the defibrillator.
26. Turn off the AED.
27. Record the results on the PIP Checklist.

PIP – Instructions

PIP – AED Automatic Advisory Operation



To test the AED automatic advisory system:

1. Use the QUIK-COMBO clinical extension cable and the QUIK-COMBO test post adapter or the FAST-PATCH cable to connect the AED to the defibrillator analyzer as shown in the illustration on the left. Set the defibrillator analyzer to NSR output (ECG 120 bpm).
2. Turn on the AED.
3. (3-button models only): Verify that you see and hear:

   PUSH ANALYZE
4. (3-button models only): Press the ANALYZE key.
5. Verify that you see and hear:

   STAND CLEAR

   ANALYZING NOW

   STAND CLEAR

PIP – Instructions

PIP – AED Automatic Advisory Operation (continued)

6. Wait a few seconds, then verify that you see and hear:

   NO SHOCK ADVISED

   CHECK FOR PULSE

   IF NO PULSE

   START CPR

   Note (3-button models only): The **START CPR** message is replaced by **PUSH ANALYZE** when the CPR TIME is set to 0 seconds.

7. Set the defibrillator analyzer to ENERGY MODE, 1000 J, and select VFib output.

8. (3-button models only): Press the ANALYZE key to charge the capacitor for the first shock.

   Note (3-button models only): It is not necessary to press the ANALYZE key for the second and third shocks if the Auto Analyze feature is set to 1 (one). However, the defibrillator analyzer output must be quickly reset to VFib prior to the start of the subsequent analysis cycles.

9. (2-button models only): Turn the AED off, then on again.

PIP – Instructions

PIP – AED Automatic Advisory Operation (continued)

10. Verify that you see and hear:

    STAND CLEAR

    ANALYZING NOW

    STAND CLEAR

11. Wait a few seconds, then verify that you see and hear:

    SHOCK ADVISED

    Note: You should hear a tone that rises in pitch, indicating that the AED is charging.

12. When the defibrillator is fully charged, verify that you see and hear:

    STAND CLEAR

    PUSH TO SHOCK

13. Press the SHOCK key.

14. Verify that the SERVICE light on the AED is off.

PIP – Instructions

PIP – AED Automatic Advisory Operation (continued)

Note: Energy levels observed in the following steps depend on which AED is under test and what settings are selected in Setup Mode. During the PIP, the AED behaves as it does during use. Therefore, Energy Protocol settings affect shock levels, and the analysis of the results of completed shocks affects subsequent shocks.

Monophasic software version 4.32 and later and all biphasic software versions: With FLEXIBLE ENERGY selected in Setup Mode, a **SHOCK ADVISED** decision following a **NO SHOCK ADVISED** decision determines that the energy delivered is the same as the previous shock.

15. Verify the discharge indication on the defibrillator analyzer. The indication on the LIFEPAK 500 Monophasic AED should be 200 J; the indication on the LIFEPAK 500 Biphasic AED should match the value selected in Setup Mode (default 200 J).

16. Repeat steps 7 through 13 for the second shock (Monophasic: 200 J or 300 J; Biphasic: 200 J to 300 J). Verify that the AED charges and discharges within the acceptable range for its energy level setting in the **Acceptable Output Range** table. The energy delivered is the level set for shock #2 on the **ENERGY SEQUENCE** screen in Setup Mode. Refer to the LIFEPAK 500 **Setup Instructions** for information on changing and verifying setup options.

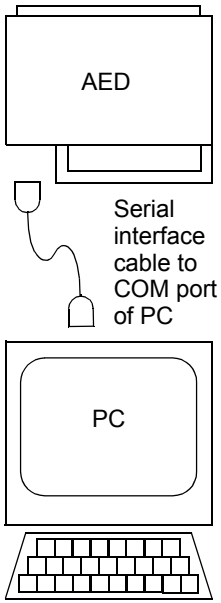
PIP – Instructions

PIP – AED Automatic Advisory Operation (continued)

17. Repeat steps 7 through 13 for the third shock. Verify that the AED charges and discharges within the acceptable range for its energy level setting in the **Acceptable Output Range** table. The energy delivered is the level set for shock #3 on the **ENERGY SEQUENCE** screen in Setup Mode, (Monophasic: 360 J; Biphasic: 200 to 360 J).
18. Turn off the AED.
19. Disconnect any component that is connected to the LIFEPAK 500 AED patient connector.
20. Record the results on the PIP Checklist.

PIP – Instructions

PIP – Computer-Assisted Tests



Perform these steps to test the AED battery voltage and current sense, slow charge rate current, ECG monitoring, motion detection, serial port communication link, power failure recovery, audio recording, alarm clock, and memory.

Note: If the hardware or software has just been updated, the Alarm Clock Test can take 2 minutes (rather than the normal 8 seconds as displayed on the Computer-Assisted PIP screen).

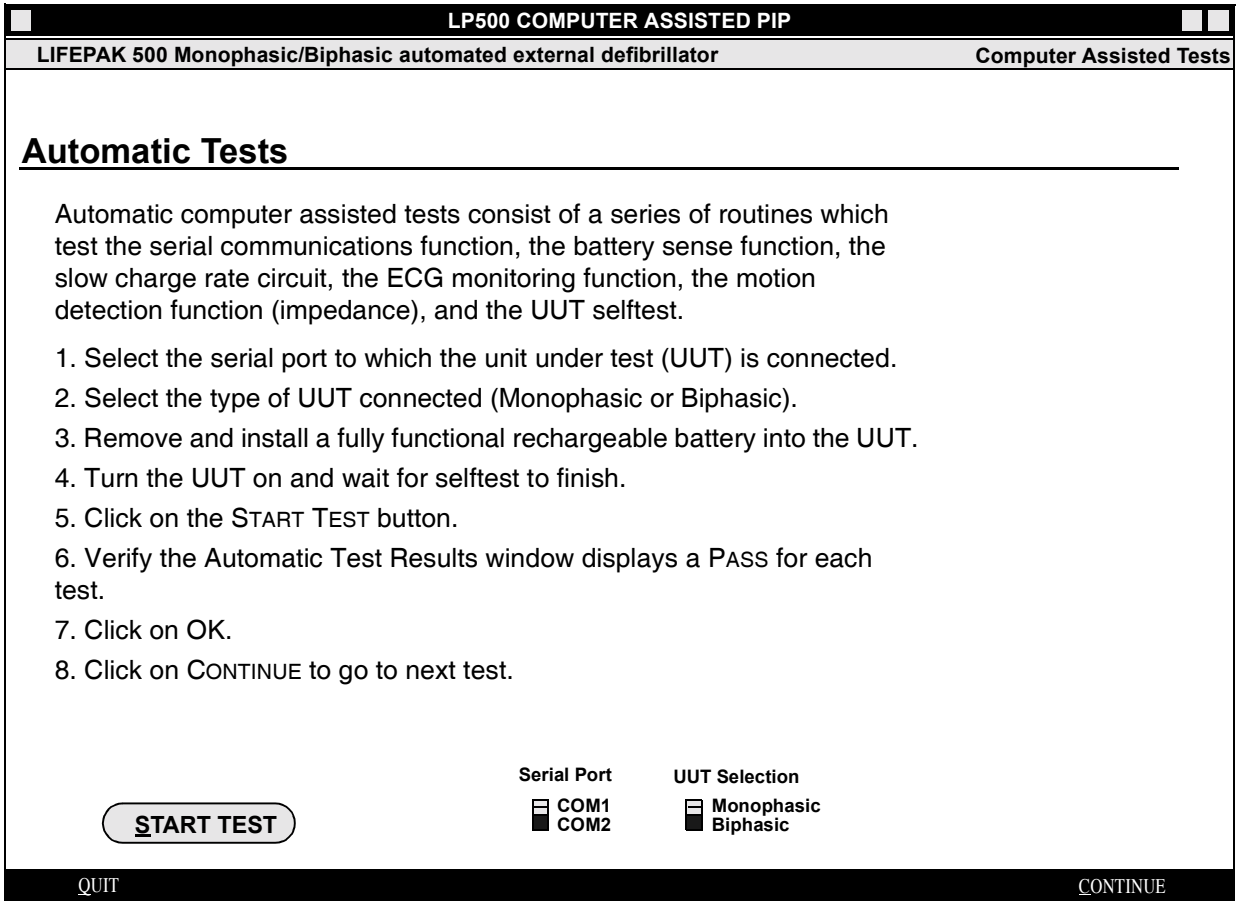
1. Use a serial interface cable to connect the AED to the Serial Communication Port (COM1 or COM2) of your computer.
2. Run the **Computer-Assisted Test**.
3. Perform the displayed on-screen procedures as prompted. Refer to the **CVI Computer-Assisted Test** opening screen.

Note: If you are testing a LIFEPAK 500 Biphasic AED, make sure the Unit-Under-Test (UUT) Selection slide-switch on the opening screen is in the Biphasic position. The default UUT is Monophasic.

4. Record the results on the PIP Checklist.

PIP – Instructions

PIP – Computer-Assisted Tests (continued)



Note: Slide-switches are shown in default positions (COM 1 and Monophasic).

PIP – Instructions

PIP – Leakage Current

Check the leakage current in accordance with the following industry standards:

- AAMI/ANSI (Association for the Advancement of Medical Instrumentation/ American National Standards Institute) DF2-1989, DF39-1993
- IEC (International Electrotechnical Commission) 601-1 and 601-2-4

WARNING!

Shock Hazard. Failure to properly perform these tests could result in a failure to detect excessive leakage current. Make sure you are familiar with your test equipment and these test performance procedures.

Note: Because of the variety of safety analyzers that may be used for these tests, this electronic service manual provides only general instructions. For information about configuration and testing methods, refer to your safety analyzer operating instructions. The **Leakage Current Limit Table** summarizes the maximum allowable current leakage. Install a fully charged battery in the defibrillator when checking leakage current.

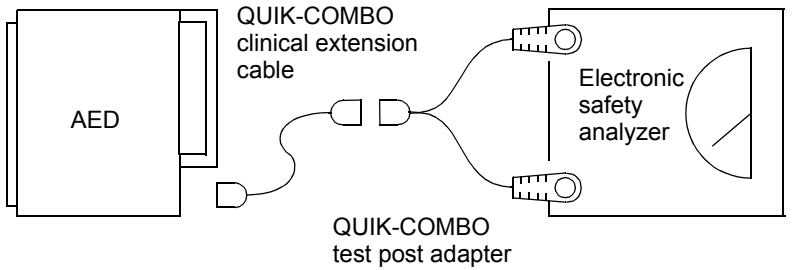
PIP – Instructions

PIP – Leakage Current (continued)

1. Use the QUIK-COMBO clinical extension cable and the QUIK-COMBO test post adapter or the FAST-PATCH cable to connect the AED to the electronic safety analyzer.
2. Verify lead-to-lead leakage current does not exceed the leakage current limit, shown below.

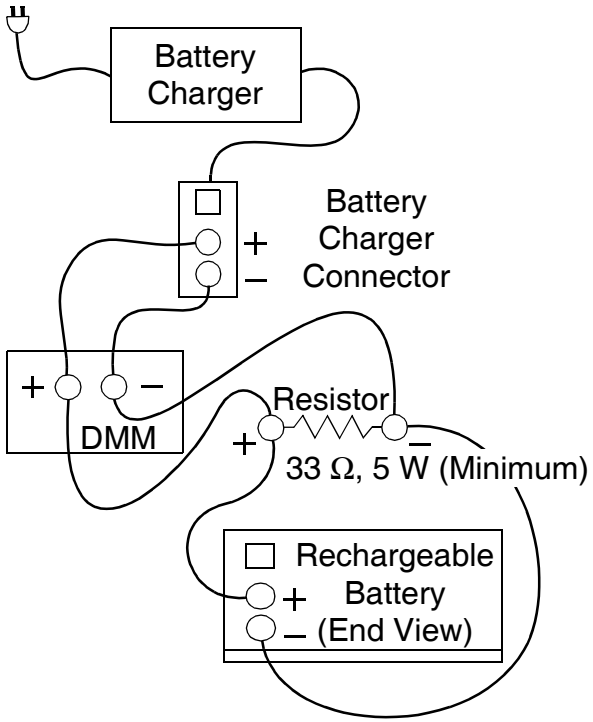
Parameter	Condition	Leakage Current Limit
Patient Connection (Defibrillation)	Lead-to-Lead	9 μA

3. Record the results on the PIP Checklist.



PIP – Instructions

PIP – Battery Charger



To test the LIFEPAK 500 AED sealed lead-acid battery charger:

1. Connect the battery charger connector, DMM, resistor, and rechargeable battery as shown in the figure at the left.

CAUTION!

Possible device damage. Do not short the test leads together. Do not reverse the test leads. Observe proper polarity.

2. Connect the battery charger to line power to initiate charge operation.
3. Disconnect one lead from the rechargeable battery.
4. Verify the voltage measured on the DMM is between 9.78 and 10.00 volts.
5. Verify the battery charger POWER and CHARGING indicators remain illuminated green and amber, respectively.

Test and Calibration Procedures

This section covers the Test and Calibration Procedures (TCP). You should complete the relevant TCP to correct out-of-specification conditions detected during the **Performance Inspection Procedure** (PIP). Also follow TCP as necessary after replacement of AED components. The listed procedures may be performed in any order.

Note: Any time the AED is opened for repair, component replacement, or calibration, the LIFEPAK 500 AED must successfully pass all portions of the closed-case **PIP** before being returned to active service. If an AED exhibits a Fault Code, contact Medtronic Physio-Control; do not place it back in service.

Scope and Applicability

Resource Requirements

Test Equipment Requirements

Battery Polarity Test—Monophasic AED

Battery Polarity Test—Biphasic AED

LCD Contrast Adjustment (LIFEPAK 500 Monophasic AED with Operating System Software Version 4.42 or Earlier Only)

Impedance Test (LIFEPAK 500 Biphasic AED only)

LIFEPAK 500 AED Energy Calibration

LIFEPAK 500 Monophasic AED Output Waveform

LIFEPAK 500 Biphasic AED Output Waveform

Memory Self-Test

Time-of-Day Clock Battery Recovery (LIFEPAK 500 Monophasic AED with Operating System Software Version 4.0 Only)

Scope and Applicability

The TCP applies to the LIFEPAK 500 Monophasic AED and LIFEPAK 500 LIFEPAK 500 Biphasic AED exclusively. You may perform the procedures outlined in this section in any order.

Note: Prior to its return to active service, the LIFEPAK 500 AED must successfully pass all portions of the closed-case **Performance Inspection Procedure** any time the AED is opened for repair or component replacement, or after calibration.

Refer to **Resource Requirements** for necessary equipment, test equipment verification, workstation power, and qualifications of the TCP personnel.

Refer to **Test Equipment Requirements** for a listing of test equipment, including specifications, required to complete the TCP.

Note: “2-button” models of the LIFEPAK 500 AED have a blank overlay key, called the “menu” key, in place of the ANALYZE key found on 3-button models. This key is for use in Setup and Service modes. Throughout this Test and Calibration Procedure, the reference “ANALYZE (or MENU) key” indicates a service-mode use of this key.

Resource Requirements

This section describes the requirements for TCP equipment, TCP test equipment verification, TCP workstation power, and TCP personnel.

TCP – Equipment

To perform the TCP, you must use the equipment listed in the **Test Equipment Requirements** table. Although the table lists specific test equipment by manufacturer, test equipment with equivalent specifications may be substituted.

TCP – Test Equipment Verification

All test equipment used to perform the TCP must have a current calibration label. The calibration label must be issued by a certified calibration facility.

TCP – Workstation Power

The ac line power to the workstation used must be connected to a grounded power source. The workstation must have Electrostatic Discharge (ESD) protection.

TCP – Personnel

Technicians who perform the TCP must be thoroughly familiar with the operation of the LIFEPAK 500 AED and must meet at least one of the following requirements (or the equivalent):

- Associate of Applied Science, with an emphasis in biomedical electronics
- Certificate of Technical Training, with an emphasis in biomedical electronics
- Equivalent biomedical electronics experience

Test Equipment Requirements

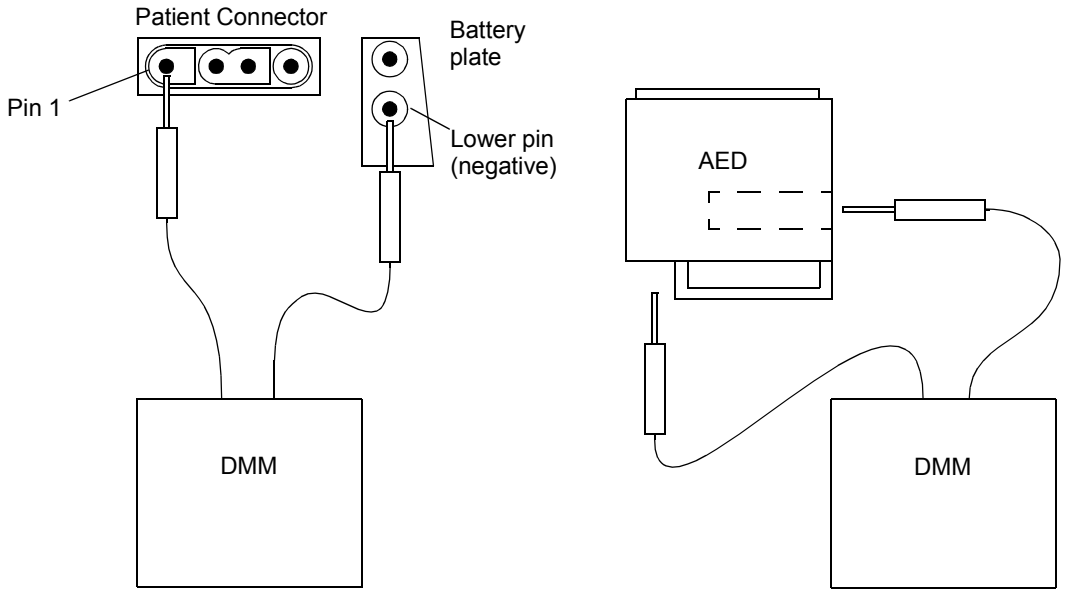
Equipment	Specifications	Manufacturer
Defibrillator analyzer	Power range: 0–450 J Load resistance: 50 Ω ±1% Accuracy ± 2% +2 J	BIO-TEK QED-6
Digital multimeter (DMM)	± 0.03% of reading + 2 digits	Fluke 8050A
LIFEPAK 500 rechargeable SLA battery pak, — or— LIFEPAK 500 nonrechargeable lithium sulpher dioxide battery pak LIFEPAK 500 nonrechargeable lithium manganese dioxide battery pak	Fully charged, properly maintained, no battery fault indications displayed by the AED	Medtronic Physio-Control PN 3005379 Medtronic Physio-Control PN 3005380 Medtronic Physio-Control PN 3200390
FAST-PATCH cable — or— QUIK-COMBO test post adapter with QUIK-COMBO female-to-male clinical extension cable		Medtronic Physio-Control PN 3010699-000 Medtronic Physio-Control PN 3005302-00 Medtronic Physio-Control PN 3011215-000
Oscilloscope (This is required if you are observing the defibrillator output waveform; otherwise, it is optional.)	Storage Scope 50 MHz, 50 ms/s minimum	

Battery Polarity Test—Monophasic AED

Perform the Battery Polarity Test after replacement of the battery cable harness. To perform the Battery Polarity Test:

1. Measure the resistance from the negative battery terminal (the lower pin on the battery plate) to the Sternum output (Pin 1 of the patient connector).

2. Verify that the resistance is less than 5 Ω.



Battery Polarity Test—Biphasic AED

Perform the Battery Polarity Test only during **Replacing Battery Plate Wire Harness**, while the case is still open. To perform the Battery Polarity Test:

1. Measure the resistance from the negative battery pin (the lower pin on the battery plate) to Pin 2 of the Molex connector that connects to the main PCB (P12).

2. Verify that the resistance is less than 2 Ω.

LCD Contrast Adjustment (LIFEPAK 500 Monophasic AED with Operating System Software Version 4.42 or Earlier Only)

CAUTION!

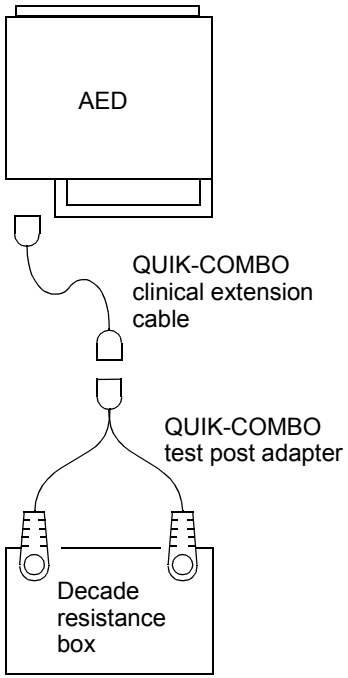
Possible device malfunction. Incorrect adjustment of the LCD contrast could affect the LCD's readability at temperature extremes of 0° and 50°C (32° and 122°F). Contact Physio-Control for further information.

To perform the LCD Contrast Adjustment:

1. Unplug all components connected to the LIFEPAK 500 AED patient connector.
2. Place the AED in **Service Mode**.
3. Press the ANALYZE (or MENU) key to advance to the **ADJUST LCD CONTRAST** screen.
4. Check the setting to ensure it is in the range 50% to 60%.

   Note: The UP ARROW key must be pressed repeatedly to cycle through the range of LCD contrast settings.
5. Turn off the AED.

Impedance Test (LIFEPAK 500 Biphasic AED only)



Perform the impedance measurement of the LIFEPAK 500 Biphasic AED only when recalibrating the defibrillation outputs.

1. Boot the AED in **Service Mode** and enter the Passcode. Press the ANALYZE (or MENU) key to advance to the **AUTO BATTERY TEST** screen. The current selection flashes. Turn the **AUTO BATTERY TEST** off by pressing the UP ARROW key. (Disregard the SERVICE indicator that appears upon re-boot.) Turn off the AED.
2. Reboot the AED in **Service Mode** but do not enter the Passcode.
3. When the keypad LCD displays the **ENTER PASSCODE** message, connect the AED to a decade resistance box set to 225 Ω, using the QUIK-COMBO test post adapter with QUICK-COMBO clinical extension cable or FAST-PATCH cable.
4. Enter the **Service Mode** Passcode key sequence. The display shows:

   CAL IMP 225 OHMS
   A XXX.X OHMS N O _

5. Press the UP ARROW key to select **YES**. Then press the ANALYZE (or MENU) key to complete the calibration of this step.

Impedance Test (LIFEPAK 500 Biphasic AED only)

6. Press the ANALYZE (or MENU) key to complete part A of the test. The display shows the message for part B:

CAL IMP 225 OHMS B XXX.X OHMS **N** **O** _

7. Make sure the decade resistance box is still set to 225 Ω. Press the UP ARROW key to select **YES**.

8. Press the ANALYZE (or MENU) key to complete this step. The display shows:

CAL IMP 25 OHMS CONTINUE? **YES**

9. Set the decade resistance box to 25 Ω.

10. Press the ANALYZE (or MENU) key to complete this step. The display shows:

CAL IMP 225 OHMS CONTINUE? **YES**

11. Set the decade resistance box to 225 Ω.Then press the ANALYZE (or MENU) key to complete this step.

Impedance Test (LIFEPAK 500 Biphasic AED only)

12. Press the ANALYZE (or MENU) key.

CAUTION!

Possible test equipment damage. Do not defibrillate into the decade resistance box. You must disconnect the decade resistance box BEFORE proceeding to the Energy Output and Charge Time test.

CAUTION! ATTACH DEFIB LOAD

13. Turn off the AED.

14. Disconnect the QUIK-COMBO cable from the AED. Remove the cable from the decade resistance box, and attach the defibrillator analyzer (defib test load).

15. Boot the AED in **Service Mode** and enter the Passcode. Press the ANALYZE (or MENU) key to advance to the **AUTO BATTERY TEST** screen. Turn the **AUTO BATTERY TEST** on by pressing the UP ARROW key. Turn off the AED. Proceed to **LIFEPAK 500 AED Energy Calibration**.

LIFEPAK 500 AED Energy Calibration

WARNING!

Shock hazard. Avoid contact with the energy meter. Dangerous voltages will be present on energy meter electrode plates/posts.

Perform the steps below to calibrate all defibrillator delivered energy levels:

Note (LIFEPAK 500 Biphasic AED only): You must first perform the **Impedance Test** before performing the energy calibration (verifying the energy output is accomplished in **PIP – Energy Output and Charge Time**).

1. Unplug all components connected to the LIFEPAK 500 AED patient connector.
2. Remove the installed battery and insert a fully functional battery (one that results in a **BATTERY OK** message during Power-On Self-Test) into the LIFEPAK 500 AED.
3. Place the AED in **Service Mode**. Do not enter the Passcode at this time.
4. When the keypad LCD displays the **ENTER PASSCODE** message, connect the AED to the defibrillator analyzer using the FAST-PATCH cable or QUIK-COMBO test post adapter and QUIK-COMBO clinical extension cable.

LIFEPAK 500 AED Energy Calibration

5. Enter the **Service Mode** Passcode key sequence.
6. Set the defibrillator analyzer to ENERGY, 1000 J scale.
7. (LIFEPAK 500 Biphasic AED only:) Press the ANALYZE (or MENU) key three times.
8. The AED displays the **CALIBRATE ENERGY** screen. Select the first energy level (Monophasic AED: 200 J; Biphasic AED: 100 J).
9. Press the ANALYZE (or MENU) key to charge to the selected energy level.
10. While the AED is charging, press and hold the SHOCK key to discharge the AED as soon as it is fully charged.
11. Enter the value displayed on the defibrillator analyzer onto the **ENTER ACTUAL ENERGY** screen. Press the UP ARROW and RIGHT ARROW keys to enter the value.

LIFEPAK 500 AED Energy Calibration

12. Repeat steps 9 through 11, if necessary, until the value displayed on the defibrillator analyzer is within acceptable output limits. Press the ANALYZE (or MENU) key to accept the value.

ENERGY SELECTED (J)	ACCEPTABLE OUTPUT (J)
100 (LIFEPAK 500 Biphasic AED only)	97.5–102.5
200 (LIFEPAK 500 Monophasic AED only)	195.0–205.0
300 (LIFEPAK 500 Monophasic AED only)	292.5–307.5
360	351.0–369.5

13. Perform the calibration procedure for the remaining energy levels by repeating steps 9 through 12. These are 300 J and 360 J for the LIFEPAK 500 Monophasic AED and 360 J for the LIFEPAK 500 Biphasic AED.
14. Turn off the AED.
15. Unplug all components connected to the LIFEPAK 500 AED patient connector. **Biphasic AEDs only:** Boot the AED in **Service Mode** and enter the Passcode. Press the ANALYZE (or MENU) key to advance to the **AUTO BATTERY TEST** screen. The current selection flashes. Turn the **AUTO BATTERY TEST** on by pressing the UP ARROW key. Turn off the AED.

LIFEPAK 500 Monophasic AED Output Waveform

The Defibrillator Output Waveform Test is optional and is intended to aid in troubleshooting for failure symptoms in the defibrillator capacitor or the wave shaping inductor. Use a fully charged battery when you perform this procedure.

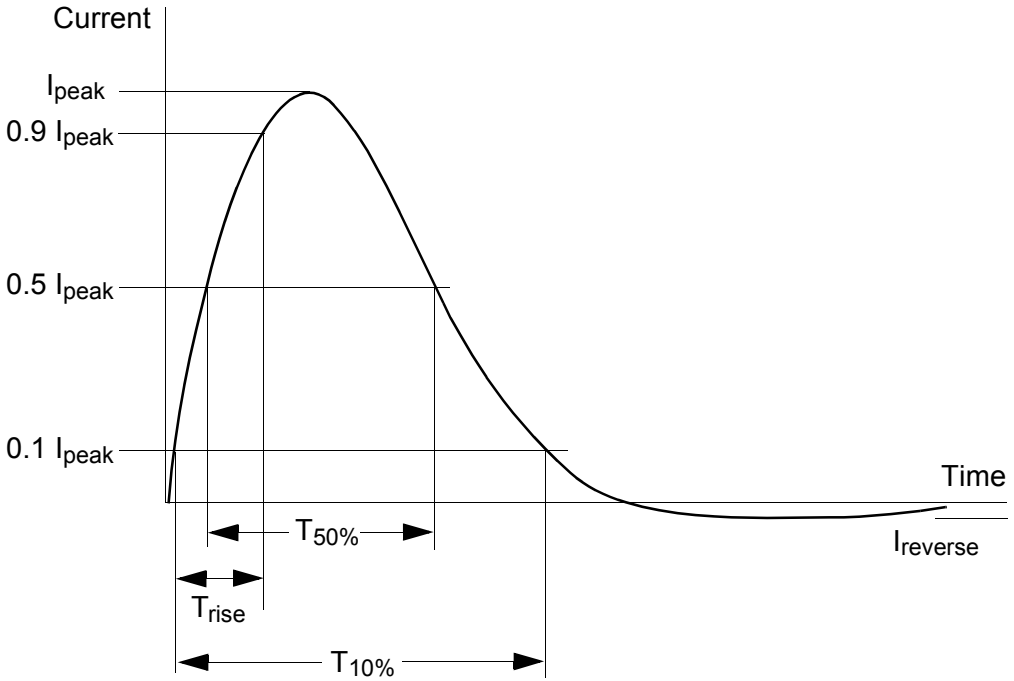
1. Connect the oscilloscope to the scope output connector of the defibrillator analyzer.
2. Set the oscilloscope to 0.5 V/div, 1 ms/div, + slope, store mode, and single sweep.

   Note: 1 V on the oscilloscope = 29 A defibrillator output current using the QED-6 energy meter. When using other energy meters, refer to the manufacturer's specifications.
3. Unplug all components connected to the LIFEPAK 500 Monophasic AED patient connector.
4. Place the AED in **Service Mode**. Do not enter the Passcode at this time.
5. When the keypad LCD displays the **ENTER PASSCODE** message, connect the AED to the defibrillator analyzer using the FAST-PATCH cable or QUIK-COMBO test post adapter and QUIK-COMBO clinical extension cable.
6. Enter the **Service Mode** Passcode key sequence.

LIFEPAK 500 Monophasic AED Output Waveform

7. Set the defibrillator analyzer to ENERGY, 1000 J scale.
8. Press the UP ARROW key to select 360 J from the **CALIBRATE ENERGY** screen.
9. Press the ANALYZE (or MENU) key to begin the charging process.
10. When the AED displays the **PUSH TO SHOCK** message, press the SHOCK key to discharge the defibrillator.
11. Verify that the waveform meets the specifications shown on the following screen.
12. After you have verified that the waveform meets the specifications, turn off the AED.
13. Disconnect all of the test equipment.

LIFEPAK 500 Monophasic AED Output Waveform



Parameter	Range
I_{peak}	45 - 66 A
$I_{reverse}$	0 - 18 A
T_{rise}	0.4 ms – 1.42 ms
$T_{50\%}$	2.10 ms – 4.17 ms
$T_{10\%}$	3.10 ms – 9.20 ms

LIFEPAK 500 Biphasic AED Output Waveform

The Defibrillator Output Waveform Test is optional and is intended to aid in troubleshooting for failure symptoms in the defibrillator capacitor, the main PCB, or the biphasic PCB. Use a fully charged battery when you perform this procedure.

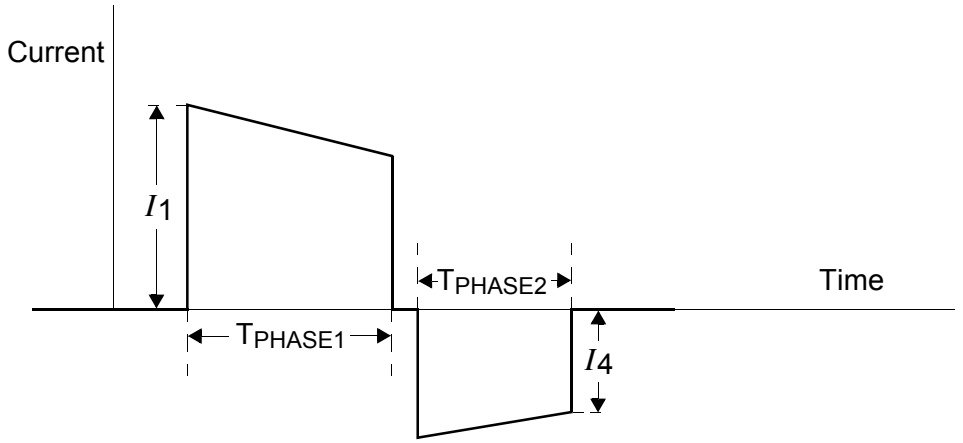
1. Connect the oscilloscope to the scope output connector of the defibrillator analyzer.
2. Set the oscilloscope to 0.5 V/div, 2 ms/div, + slope, store mode, and single sweep.

   Note: 1 V on the oscilloscope = 29 A defibrillator output current using the QED-6 energy meter. When using other energy meters, refer to the manufacturer's specifications. You may need to slow down the horizontal sweep and/or turn on the triggering high-frequency reject to successfully capture the waveform.
3. Unplug all components connected to the LIFEPAK 500 Biphasic AED patient connector.
4. Place the AED in **Service Mode**. Do not enter the Passcode at this time.
5. When the keypad LCD displays the **ENTER PASSCODE** message, connect the AED to the defibrillator analyzer using the FAST-PATCH cable or QUIK-COMBO test post adapter and QUIK-COMBO clinical extension cable.

LIFEPAK 500 Biphasic AED Output Waveform

6. Enter the **Service Mode** Passcode key sequence.
7. Set the defibrillator analyzer to ENERGY, 1000 J scale.
8. Press the ANALYZE (or MENU) key three times to bypass the **IMPEDANCE TEST** screen and advance to the **CALIBRATE ENERGY** screen.
9. Press the UP ARROW key to select 360 J from the **CALIBRATE ENERGY** screen.
10. Press the ANALYZE (or MENU) key to begin the charging process.
11. When the AED displays the **PUSH TO SHOCK** message, press the SHOCK key to discharge the defibrillator.
12. Verify that the waveform meets the specifications shown on the following screen.
13. After you have verified that the waveform meets the specifications, turn off the AED.
14. Disconnect all of the test equipment.

LIFEPAK 500 Biphasic AED Output Waveform



Patient Impedance (Ω)	T_{PHASE1} (ms)		T_{PHASE2} (ms)		Tilt	
	Min	Max	Min	Max	Min	Max
50	6.8	7.9	4.5	5.3	63.9	71.0

Note 1.Delivered waveform at 360 joules into given resistive load.
Note 2.Discharge polarity is APEX positive, STERNUM negative for Phase 1.

Note 3. $\text{Tilt} = \frac{(I_1 - |I_4|)}{I_1}$

Memory Self-Test

Always perform the Memory Self-Test after you have replaced the main PCB. Perform the Memory Self-Test in the following manner:

1. Unplug all components connected to the LIFEPAK 500 AED patient connector.
2. Place the AED in **Service Mode**.
3. Let the AED run for 2 minutes.
4. Verify that there are no logged error codes.
5. Turn off the AED.

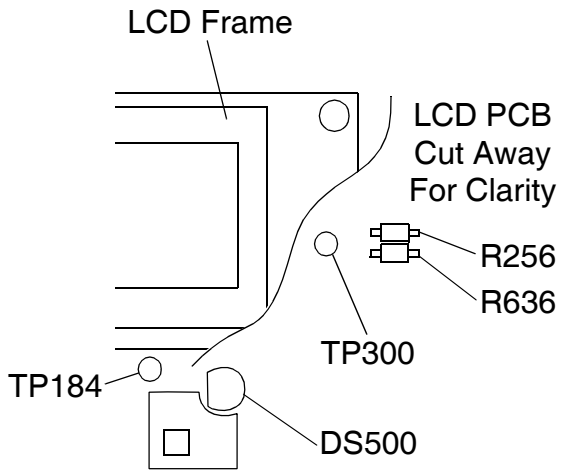
Time-of-Day Clock Battery Recovery (LIFEPAK 500 Monophasic AED with Operating System Software Version 4.0 Only)

The LIFEPAK 500 Monophasic AED with Operating System Software Version 4.0 may fail to complete the boot routine when the AED is turned on after the Time-of-Day Clock battery has been replaced. Perform the following procedure to restore normal AED operation.

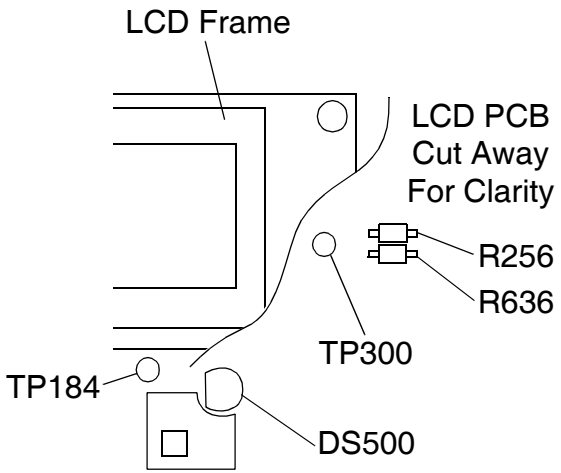
WARNING!

Shock hazard. Do not touch or make any connections to exposed circuitry except as directed in this service manual.

1. Insert a battery into the AED that you know is fully functional. A fully functional battery is defined as a battery that does not return battery fault indications. (In the LIFEPAK 500 biphasic AED with Readiness Display, the message OK indicates a good battery.)
2. Turn on the LIFEPAK 500 AED.
3. Momentarily connect an insulated jumper between TP300 and the metal LCD frame as shown at the left. The AED should execute the boot routine soon after removal of the jumper.



Time-of-Day Clock Battery Recovery (LIFEPAK 500 Monophasic AED with Operating System Software Version 4.0 Only)



Note: The LIFEPAK 500 AED may boot into the **CONNECT ELECTRODES** state or display a major fault after completing the Time-of-Day Clock Battery Recovery procedure. Either mode of operation is considered normal and indicates successful Time-of-Day Clock Battery Recovery.

4. If the AED fails to boot up as specified, momentarily connect an insulated jumper cable between TP300 and TP184 as shown at the left. The AED should execute the boot routine soon after removal of the jumper.

   Note: If the LCD frame is anodized, use an alternate ground for step 3: Connect the jumper between TP300 and the preamp shield on the PCB.

   Note: Do not leave the jumper connected for more than one second.

5. Turn off the LIFEPAK 500 AED.

   Note: If necessary, place the AED in **Service Mode** to review and clear any fault codes resulting from Time-of-Day Clock Battery Recovery.

6. Return to the **Reassembling Case** procedure after completing the Time-of-Day Clock Battery Recovery.

   Note: After changing the clock battery, record two events to ensure proper extraction of patient data when the AED is returned to service.

Troubleshooting

The Troubleshooting section describes fault code usage, interpretation, and corrective action. The section also includes a separate Troubleshooting Chart keyed to the Performance Inspection Procedure for use in problem resolution.

Fault Codes

Corrective Action Codes

Fault Code Table

Troubleshooting Chart

Fault Codes

The LIFEPAK 500 AED logs a fault code whenever an internal program or process fails to execute properly. Fault codes are grouped into major (8000 and above) and minor categories. The AED Fault Code Log stores the first 5 major and first 30 minor faults. Any fault codes in excess of these limits are not recorded. Fault codes rarely occur during routine AED use and should be investigated thoroughly by qualified personnel before an AED is returned to active service. Refer to the Fault Code Table for one or more recommended Corrective Action Codes (CAC) to address each specific fault.

Note: Record the code(s), the date(s), and time(s) of occurrence for any fault code(s), then **Clear the Fault Code(s)**. Check for a recurrence of any fault code(s). Always complete the **Performance Inspection Procedure (PIP)** after encountering and clearing any fault code(s).

Fault codes stored in the Fault Code Log may not necessarily indicate a permanent error. Fault codes can indicate transient electromagnetic interference (EMI) or electrostatic discharge (ESD). If you suspect transient EMI or ESD as the source of a fault, **Clear Fault Codes(s)**, then shut down and restart the AED (it may be necessary to do this twice for 91XX codes). If the fault code does not recur, it may have been the result of EMI or ESD.

Corrective Action Codes

Corrective action codes are listed in the Fault Code Table in the order in which they should be applied to resolve a specific fault. For example, fault code 5721 suggests two corrective action codes: CAC 7 and CAC 2. The service person would first inspect the AED wiring associated with the fault, per CAC 7. If wiring is found to be intact, the Main PCB should be replaced, per CAC 2.

Corrective Action Code	Description
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5100	boot_fault_minor	10
5101	cannot_determine_date_for_autotest	9
5102	insufficient_shutdown_time	10, 2
5240	eeprom_fault_minor	6, 2
5241	eat_bad_setup_features_crc	6, 2
5242	eat_bad_modem_data_crc	6, 2
5243	eat_bad_calconstants_crc	6, 2
5244	eat_bad_dutycycles_crc	6, 2
5245	eat_bad_shockcountdata_crc	6, 2
5246	eat_bad_operatingtime_crc	6, 2
5247	eat_bad_manufacturingdata_crc	6, 2
5248	eat_bad_initdata_crc	6, 2
5249	eat_bad_aed_mode_crc	6, 2
524a	eat_bad_aed_state_crc	6, 2
524b	eat_bad_cmonstatedata_crc	6, 2
524c	eat_bad_episodeshockcount_crc	6, 2
524d	eat_bad_selectedenergy_crc	6, 2
524e	eat_bad_seriesshockcount_crc	6, 2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
524f	eat_bad_lastdatatransferstatusdata_crc	6, 2
5250	fault_log_info_bad_test_log_entry_crc	6, 2
5251	fault_log_info_bad_fault_log_entry_crc	6, 2
5252	unreasonable_pulse_prompt_feature_enabled_value	6
5253	unreasonable_motion_detection_feature_enabled_value	6
5254	unreasonable_auto_analyze_feature_enabled_value	6
5255	unreasonable_scene_audio_recording_feature_enabled_value	6
5256	unreasonable_auto_battery_test_feature_enabled_value	6
5257	unreasonable_cpr_time_interval_value	6
5258	unreasonable_energy_setting_value	6
5259	unreasonable_led_brightness_duty_cycle_value	6
525a	unreasonable_lcd_contrast_duty_cycle_value	6
525b	unreasonable_last_data_transfer_status_value	6
525c	eeprom_hardware_problem_first	2
525d	eeprom_no_ack_to_write	2
525e	eeprom_burn_incomplete	2
525f	eat_eeprom_not_accessible	2
5260	eeprom_not_responding_to_poll	2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5261	eeprom_tpu_channel_not_responding	2
5262	eat_eeprom_write_block_failure_1	2
5263	eat_eeprom_write_block_failure_2	2
5264	eeprom_hardware_problem_last	2
5265	eat_archive_qpdr_clash	6, 2
5266	eat_init_data_read_failure	6, 2
5267	eat_bad_papersize_crc	6, 2
5268	unreasonable_papersize_value	6
5269	eat_bad_cpss_crc	6, 2
526a	eat_bad_asystole_time_crc	6, 2
526b	unreasonable_manufact_config_analyze_key_value	6, 2
526c	unreasonable_manufact_config_recording_equipped_value	6, 2
526d	unreasonable_manufact_config_speaker_value	6, 2
526e	eat-bad-manufact_config_key_crc	6, 2
526f	unreasonable_energy_protocol_value	6, 2
5270	unreasonable_manufact_config_voltage_comp_value	6, 2
5271	unreasonable_energy_display_enabled_value	6, 2
5272	unreasonable_request_incident_id_enabled_value	6

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5273	eat_bad_last_incident_id_crc	6, 2
5274	eat_bad_alert_timer_option_crc	6, 2
5280	flash_fault_minor	10
5281	flashdrv_suspend_block_erase_wsm_busy	10, 2
5282	flashdrv_resume_block_erase_not_suspended	10, 2
5283	flashdrv_resume_block_erase_not_resumed	10, 2
5284	flashdrv_resume_block_erase_wsm_not_busy	10, 2
5285	flashio_cannot_clear_device	2
5286	flashio_erase_block_invalid_index	10, 2
5287	flashio_erase_complete_status_bad	10, 2
5288	flashio_erase_iterations_exceeded	10, 2
5289	flashio_initialize_unknown_device	2
528a	flashio_write_byte_not_successful	2
528b	flashio_write_byte_wsm_busy	2
528c	flashio_wsm_not_ready	2
528d	active_episode_info_duplicate_block_sequence_number	10
528e	active_episode_info_block_sequence_number_out_of_range_1	10
528f	active_episode_info_block_sequence_number_out_of_range_2	10
5290	active_episode_info_bad_block_detected_1	10, 2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5291	event_retrieval_crc_fault	10, 2
5292	event_retrieval_incorrect_event_id	10, 2
5293	intermediate_results_retrieval_crc_fault	10, 2
5294	scene_audio_directory_entry_write_failure	10, 2
5295	scene_audio_block_state_write_failure	10, 2
5296	scene_audio_data_write_failure	10, 2
5297	scene_audio_block_state_status_write_failure	10, 2
5298	scene_audio_checksum_failure	10, 2
5299	obsolete_scene_audio_sample_number_out_of_order	10
529a	summarization_ecg_decompression_error	10
529b	summarization_z_decompression_error	10
529c	summarization_ecg_compression_error	10
529d	summarization_z_compression_error	10
529e	summarization_ecg_wbtf_error	10
529f	summarization_z_wbtf_error	10
52a0	summarization_wde_wbtf_error	10
52a1	waveform_wde_number_of_ecg_samples_mismatch	10
52a2	waveform_wde_number_of_z_samples_mismatch	10

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
52a3	archive_task_communications_resources_not_created	10
52a4	active_episode_info_bad_block_detected_2	10, 2
52a5	pbsu_bad_block_detected	10, 2
52a6	waveform_directory_retrieval_crc_fault_1	10, 2
52a7	waveform_data_retrieval_crc_fault_1	10, 2
52a8	waveform_directory_retrieval_crc_fault_2	10, 2
52a9	waveform_data_retrieval_crc_fault_2	10, 2
52aa	data_flash_test_erase_failure	2
52ab	data_flash_test_pattern_failure	2
52ac	data_flash_test_zero_pattern_failure	2
5400	dsp_comm_fault_minor	10, 2
5401	dsp_comm_no_ack	10, 2
5402	dsp_comm_sample_number_not_stored	10, 2
5403	dsp_comm_queue_full	10, 2
5404	dsp_comm_shutdown_data_corrupted	10, 2
5405	distrib_incorrect_size_compressed_audio	10
5406	distrib_incorrect_size_leads_condition	10
5407	distrib_incorrect_size_energy_status	10

Corrective Action Code Key

Code	Description
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5408	distrib_incorrect_size_raw_a2d_data	10
5409	distrib_incorrect_size_dsp_execution_count	10
540a	distrib_incorrect_size_report_fault	10
540b	dsp_comm_no_spectrum_data	10, 2
5500	rtc_fault_minor	9, 2
5501	rtc_autotest_not_scheduled	10, 9, 2
5502	rtc_nvram_crc_error	9, 2
5600	analyze_fault_minor	10
5601	mwb_samples_acquired_too_slow	10
5602	mwb_ecg_samples_out_of_order	10
5603	sas_task_dropped_leads_status_message	10
5604	sas_task_dropped_waveform_message	10
5605	sas_task_ecg_samples_not_contiguous	10
5606	incorrect_sizeof_waveform_data_type	10
5607	confirmation_of_ecg_samples_out_of_order_fault	10
5608	sas_task_voting_no_decision	10
5700	control_fault_minor	10
5701	control_missing_startup_switch_msg	10

Corrective Action Code Key

Code	Description
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5702	control_unknown_dsp_msg_id	10
5703	control_start_inactivity_timer_failed	10
5704	control_unknown_interproc_data_category	10
5705	control_analysis_timer_expired	10
5706	control_dsp_shock_agree_timer_expired	6
5707	control_start_cpss_activation_timer_failed	10
5708	control_start_episode_commit_timer_failed	10
5709	control_start_prompt_display_timer_failed	10
570a	control_start_clock_inactivity_timer_failed	10
570b	control_start_cpr_timer_failed	10
570c	control_start_shock_timer_failed	10
570d	control_start_dsp_shock_agree_timer_failed	8, 6, 2
570e	control_start_wait_for_charge_timer_failed	8, 6, 4, 2
570f	control_start_analysis_timer_failed	10
5710	control_setup_first_shock_low_energy	6
5711	control_setup_first_shock_unknown_energy	6
5712	control_setup_second_shock_low_energy	6
5713	control_setup_second_shock_unknown_energy	6

Corrective Action Code Key

Code	Description
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5714	control_setup_third_shock_low_energy	6
5715	control_setup_third_shock_unknown_energy	6
5716	control_setup_invalid_cpr_time_interval	6
5717	control_setup_second_shock_invalid_energy	6
5718	control_setup_invalid_cpr_interval_selection	6
5719	control_service_wait_for_charge_timer_expired	8, 6, 4, 2
571a	control_service_unknown_energy	6, 2
571b	control_start_service_prompt_display_timer_failed	10
571c	control_series_shock_counter_default_installed	6, 2
571d	control_episode_shock_counter_default_installed	6, 2
571e	control_selected_shock_energy_default_installed	6, 2
571f	control_mode_default_installed	9, 6, 2
5720	control_state_default_installed	9, 6, 2
5721	control_tx_rx_shorted	7, 2
5722	control_user_test_charge_timer_expired	8, 6, 4, 2
5723	control_user_test_refuse_to_charge	8, 6, 4, 2
5724	control_normal_mode_charge_timer_expired	8, 6, 4, 2
5725	control_normal_mode_refuse_to_charge	6, 2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5726	control_service_refuse_to_charge	6, 2
5727	control_setup_invalid_speaker_option	6
5800	defib_fault_minor	10
5801	shock_not_confirmed_by_dsp	2
5802	sensed_fet_xfer1_inactive_before_shock	2
5803	defib_voltage_over_target	2
5804	charging_overcurrent	2
5805	defib_charge_rate_too_low	8, 7, 4, 2
5806	defib_illegal_state_for_charging	10
5807	defib_illegal_state_for_shock	10
5808	defib_excessive_shock_recovery_time	8, 6, 2
5809	defib_incomplete_discharge	2
580a	defib_low_energy_available	8, 4, 6, 2
580b	energy_cal_factor_unknown	6, 2
580c	energy_calibration_rejected	6, 2
580d	defib_reading_mismatch_hv_mon0_mon1	2 (See NOTE →)
580e	xfer1_activated_too_fast	2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB (for Fault Code 580d, see NOTE below)
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

NOTE: For Fault Code 580d, first make sure AED software revision is 4.8 or later (monophasic). Contact Medtronic Physio Control if necessary to **upgrade software**. If Fault Code 580d recurs, replace the main PCB.

Fault Code Table

Code	Fault Description	Corrective Action Code
580f	xfer_fets_output_too_fast	2
5810	xfer1_failed_activation	2
5811	defib_reset_before_quick_alarm	9, 6, 2
5812	defib_shock_data_crc_fault	8, 10, 2
5813	defib_charge0_stuck	2
5814	defib_charge1_stuck	2
5815	defib_charge_rate_too_high	2
5816	depassivated_circuit_selftest_failed	2
5817	defib_hi_freq_impedance_uncal	6, 2
5818	defib_lo_freq_impedance_uncal	6, 2
5819	defib_biphasic_relay_drive_inactive	6, 2
5900	safmon_fault_minor	10
5901	qspi_safety_atods_not_digitizing	2
5902	vcc_out_of_range	2
5903	vpp_out_of_range	2
5904	vdd_out_of_range	2
5905	vee_out_of_range	2
5906	va_out_of_range	2
5907	dsp_ad_ref_slightly_out_of_range	2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5908	safmon_cont_mon_task_did_not_run	10
5909	safmon_bad_rtc	9, 2
590a	safemon_defib_cap_unexpected_charge	2
590b	safemon_excessive_battery_current	10, 2
590f	zpredicted_out_of_spec	6, 2
5a00	data_com_fault_minor	10
5a01	data_com_mem_mgmt_invalid_buffer_ptr	10
5a02	al_locked_large_buffer_discarded	10
5c00	util_fault_minor	10
5f00	bte_fault_minor	6
5f01	bte_hv_mon0_mismatch	10, 11, 2
5f02	bte_failed_xfer_input	10, 11, 2
5f03	bte_failed_dump_input	10, 11, 2
5f04	bte_failed_htest_input	10, 11, 2
5f05	bte_xfer_vcap_invalid	10, 11
5f06	bte_phase1_imped_low	10, 11
5f07	bte_phase1_imped_high	10, 11
5f08	bte_phase2_imped_low	10, 11
5f09	bte_phase2_imped_high	10, 11

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
5f0a	bte_failed_htest_short1	11
5f0b	bte_failed_htest_short2	11
5f0c	bte_failed_htest_short3	11
5f0d	bte_failed_htest_open1	11
5f0e	bte_failed_htest_open2	11
5f0f	bte_failed_htest_unscaled	11
5f10	bte_failed_htest_scaled	11
5f11	bte_failed_htest_vcap_high	10, 11, 2
5f12	bte_failed_htest-vcap_low	10, 11, 2
5f13	bte_failed_vref_high	11
5f14	bte_failed_vref_low	11
5f15	bte_failed_htest_agc	11
5f16	bte_failed_dump	11
5f17	bte_failed_htest_unknown	11
5f18	bte_faultline_error	10, 11
6100	dsp_hostcomm_fault_minor	10
6101	dsp_hostcomm_pkt_no_ack	10
6102	dsp_hostcomm_bad_packets_rx	10

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
6103	dsp_hostcomm_tx_length_err	10
6200	dsp_acq_fault_minor	10
6201	acq_a2d_channel_error	2
6202	acq_a2d_no_avail_buff	10
6203	acq_ssi_rx_error	2
6204	acq_not_used	10
6205	acq_isr_timing_error	10
6300	dsp_defib_fault_minor	10
6301	defib_cap_voltage_sample_missed	10
6302	defib_cap_voltage_acq_error	10
6303	dsp_energy_cal_factor_unknown	6, 2
6500	dsp_boot_fault_minor	10
6600	dsp_a2d_chan_fault_minor	2
6601	dsp_fault_last	10
8000	major_fault	10
9100	boot_fault_major	10
9101	boot_ram_access_fail	2
9102	boot_dsp_not_initializing	10, 2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
9103	boot_dsp_download_fail	10, 2
9104	boot_program_flash_crc_fail	1, 2
9105	boot_cpu_test_fail	2
9106	boot_program_flash_cksum_fail	1, 2
9107	boot_internal_ram_fail	2
9108	boot_wdog_fail_too_fast_strobe	10, 2
9109	boot_wdog_fail_too_slow_strobe	10, 2
910a	boot_wdog_reset	10, 2 (see note)
910b	boot_dsp_ram_selftest_fail	2
910c	boot_qspi_failed_to_initialize	2
910d	boot_provide_rtc_task_init_failure	10
910e	boot_sysfault_task_init_failure	10
910f	boot_timebase_mon_task_init_failure	10
9110	boot_uif_task_init_failure	10
9111	boot_manage_dsp_task_init_failure	10
9112	boot_datcom_task_init_failure	10
9113	boot_control_aed_task_init_failure	10
9114	boot_sas_task_init_failure	10

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

NOTE: For Fault Code 910a, first ensure that the software revision is 4.2 or later (monophasic). If necessary, contact Medtronic Physio-Control to **upgrade software**. If Fault Code 910a recurs, replace the main PCB.

Fault Code Table

Code	Fault Description	Corrective Action Code
9115	boot_defib_task_init_failure	10
9116	boot_cmon_task_init_failure	10
9117	boot_iv_bus_error	10
9118	boot_iv_address_error	10
9119	boot_iv_illegal_instruction	10
911a	boot_iv_zero_divide	10
911b	boot_iv_privilege_violation	10
911c	boot_unexpected_interrupt	10
911d	boot_rtc_oscillator_failure	9, 2
9400	dsp_comm_fault_major	10
9401	dsp_not_initializing	10, 2
9402	dsp_code_download_failed	10, 2
9403	dsp_comm_timeout_no_data_recvd	10
9404	dsp_comm_bad_packet_detected	10
9600	analyze_fault_major	10
9601	sas_task_waveforms_absent	10
9700	control_fault_major	10
9703	control_start_lead_status_timer_failed	10
9704	control_lead_status_update_timeout	10

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
9800	defib_major	10
9801	defib_cap_not_holding_charge	4, 10, 2
9802	defib_relay_driver_shorted	2
9803	defib_no_remnant_charge_after_energy_transfer	4, 10, 2
9804	defib_biphasic_relay_drive_inactive	10, 11
9900	safmon_fault_major	10
9901	dsp_ad_ref_grossly_out_of_range	2
9903	safmon_control_aed_task_did_not_run	10
9904	safmon_bad_system_timebase	9, 10, 2
9905	safemon_bad_dsp_timebase	9, 10, 2
9906	safemon_sys_vs_dsp_timebase_mismatch	10, 2
9907	safemon_defib_cap_excessive_unexpected_charge	2
9908	battery_voltage_out_of_range	8, 2
9909	ecg_preamp_lower_cutoff_out_of_spec	2
990a	ecg_preamp_upper_cutoff_out_of_spec	2
990b	z_preamp_lower_cutoff_out_of_spec	2
990c	z_preamp_upper_cutoff_out_of_spec	2
990d	ecg_peak_gain_out_of_spec	2

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
990e	z_peak_gain_out_of_spec	2
990f	zpredicted_out_of_spec	2 (see note)
9910	zabsolute_out_of_spec	6, 2
9911	test_cap_charge_faile	6, 2
9912	loose_lead_out_of_spec	6, 2
9913	autotest_no_htest	10, 11, 2
9a00	data_com_fault_major	10
9b00	contin_fault_major	10
9b01	contin_ram_fail_sys	2
9b02	contin_crc_fail_sys	1, 2
9b03	contin_wdog_fail	2
9b04	contin_iram_fail_sys	2
9b05	slimp_fail	2
9b06	cpu_test_fail	2
9b07	contin_stack_too_small	10
9b08	contin_stack_too_small_twatchdog	10
9b09	contin_stack_too_small_tstartup	10
9b0a	contin_stack_too_small_ttimebasemon	10

Corrective Action Code Key

Code	Description
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

NOTE: For Fault Code 990f, ensure that the software revision is 3.6 or later (biphasic). If necessary, contact Medtronic Physio-Control to **upgrade software**. If Fault Code 990f recurs, replace the main PCB.

Fault Code Table

Code	Fault Description	Corrective Action Code
9b0b	contin_stack_too_small_tshutdown	10
9b0c	contin_stack_too_small_tdsp_comm	10
9b0d	contin_stack_too_small_tuart_comm_recv	10
9b0e	contin_stack_too_small_tdeterminecurrentkeystate	10
9b0f	contin_stack_too_small_tdistrib	10
9b10	contin_stack_too_small_tuart_comm_xmit	10
9b11	contin_stack_too_small_ttrans	10
9b12	contin_stack_too_small_tapp	10
9b13	contin_stack_too_small_tdefib	10
9b14	contin_stack_too_small_tuserinterface_task	10
9b15	contin_stack_too_small_tcontrol_aed_task	10
9b16	contin_stack_too_small_tsas	10
9b17	contin_stack_too_small_teeprom	10
9b18	contin_stack_too_small_tfaults	10
9b19	contin_stack_too_small_tpres	10
9b1a	contin_stack_too_small_tarch	10
9b1b	contin_stack_too_small_tcontinmonitor	10
9d00	exception_fault_major	10
9e00	bus_fault_major	10

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Fault Code Table

Code	Fault Description	Corrective Action Code
9f00	bte_fault_major	11
9f01	bte_not_initializing	11
9f02	bte_not_communicating	11
9f03	bte_ram_failed	11
9f04	bte_rom_crc_failed	11
9f05	bte_cpu_failed	11
9f06	bte_osc_freq_error	11
9f07	bte_wdog_failed	11
9f08	bte_xfer_trunc_error	10, 11
9f09	bte_htest_wdog_failure	11
9f0a	bte_could_not_perform_htest	11
a100	dsp_hostcomm_fault_major	10
a200	dsp_acq_fault_major	10
a201	acq_v_ref_safe_large_error	2
a300	dsp_defib_fault_major	10
a301	defib1_cap_voltage_over_maximum	10, 4, 2
a400	dsp_selftest_fault_major	10
a401	dspself_a2d_loop_test_fail	2
a402	dspself_stack_full	10

Corrective Action Code Key	
Code	**Description**
1	Try to reload the software
2	Replace the Main PCB
3	Replace the Connector
4	Replace the Energy Storage Capacitor
5	Replace the Inductor
6	Recalibrate/Restore Setup, Complete PIP, Return to service if fault codes do not recur
7	Check the Wires
8	Check the Battery
9	Replace the Time-of-Day Clock Battery
10	Clear Faults, Complete PIP, Return to service if fault codes do not recur
11	Replace the Biphasic PCB

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Physical Inspection	Loose or broken hardware	■ Locate and tighten or replace loose items. ■ Locate and replace broken components.
	Damaged label or overlay	■ Replace label or overlay.
	Broken or cracked case component	■ Replace case component.
	Damaged or contaminated patient connector	■ Clean or replace patient connector.

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Power On	No power on	■ Use a fully functional battery. ■ Check installation of ON/OFF key switch cap. ■ Check battery connection to Main PCB J12. ■ Check battery pins. ■ Check battery polarity. ■ Reload operating system (Medtronic Physio-Control only). ■ Check or replace the Main PCB.
	Improper power on sequence	■ Verify instructions and retry test. ■ Check or replace Time-of-Day Clock Battery. ■ Check or replace Main PCB.
Keyboard Test	Cannot enter Service Mode	■ Verify instructions and retry test. ■ Check installation of key switch caps. ■ Check keypad overlay. ■ Verify that the top cover is properly installed. ■ Check or replace Main PCB.

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Auto Battery Test Enabled	Cannot clear service indicator	■ Enter Service Mode and set Auto Battery Test to **ON**.
Record Operating Data	Unable to access shock counter Unable to clear shock counter Unable to access hour meter Unable to clear hour meter	■ Verify instructions and retry operation. ■ Check installation of key switch caps. ■ Check keypad overlay. ■ Verify top cover properly installed. ■ Replace Main PCB.
Time and Date	Incorrect time and date	■ Use Time-of-Day Clock Set procedure to reset to proper time and date. ■ Replace Time-of-Day Clock battery.
	Cannot set time or date	■ Verify instructions and retry operation. ■ Replace Time-of-Day Clock battery. ■ Check installation of key switch caps. ■ Check keypad overlay. ■ Verify top cover properly installed. ■ Replace Main PCB.

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Electrode Impedance	Incorrect message response to impedance settings	■ Verify test setup and retry test. ■ Check decade box operation and settings. ■ Check test cable continuity. ■ Perform TCP – Battery Polarity Test. ■ Inspect patient/interface connector for damage. ■ Check patient/interface cable connections to Main PCB J2 and J4. ■ Replace Main PCB.
Energy Output and Charge Time	Defibrillator will not charge	■ Verify instructions and retry operation. ■ Verify a setup and retry test. ■ Use a fully functional battery. ■ Check connections between Energy Storage Capacitor (C1- and C1+) and Main PCB (P1 and P5). ■ Check or replace Energy Storage Capacitor. ■ Replace Main PCB.

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Energy Output and Charge Time (continued)	Defibrillator fails to discharge	■ Verify instructions and retry operation. ■ Verify test setup and retry test. ■ Check inductor connections to Energy Storage Capacitor (P13) and transfer relay (P14). ■ Check or replace Main PCB.
	Delivered energy out of tolerance	■ Verify instructions and retry operation. ■ Verify test setup and retry test. ■ Perform TCP – Energy Calibration. ■ Check or replace Energy Storage Capacitor. ■ Check or replace Main PCB. ■ (LIFEPAK 500 Biphasic AED only): Replace Biphasic PCB. ■ (LIFEPAK 500 Biphasic AED only): Replace Inductive Resistor.

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Energy Output and Charge Time (continued)	Charge to 360 J exceeds 15 seconds	■ Run first-Monday-of-the-month self-test. ■ Verify instructions and retry operation. ■ Use a fully functional battery. ■ Check or replace Battery Plate Wire Harness. ■ Check or replace Energy Storage Capacitor. ■ Check or replace Main PCB.
Automatic Advisory Operation	Inappropriate or unintelligible screen messages	■ Reload operating system (Medtronic Physio-Control only). ■ Check or replace Main PCB.
	Inappropriate or unintelligible voice prompts	■ Check or replace speaker. ■ Reload operating system (Medtronic Physio-Control only). ■ Check or replace Main PCB.
	Improper response to analysis of NSR input	■ Verify test setup and retry test. ■ Verify simulator delivers standard NSR signal. ■ Contact Medtronic Physio-Control Technical Services for assistance.

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Automatic Advisory Operation (continued)	Improper response to analysis of VF input	■ Verify test setup and retry test. ■ Verify VF is present when analysis prompt starts. ■ Verify simulator delivers standard VF signal. ■ Contact Medtronic Physio-Control Technical Services for assistance.
	Inappropriate second shock energy level	■ Use Options Setup to establish desired energy sequence.
Computer-Assisted Tests	Failure to initialize automated test application	■ Verify proper installation of computer-assisted test routines.
	UUT fails to respond to test stimuli	■ Verify instructions and retry operation. ■ Verify test setup and retry test. ■ Verify AED connection to an operational computer COM port. ■ Use a fully functional battery.
	UUT fails Automatic Tests	■ Verify instructions and retry operation. ■ Check or replace Main PCB.

Troubleshooting Chart

Area	Observation	Suggested Corrective Action
Computer-Assisted Tests (continued)	UUT fails Alarm Clock Test	■ Verify instructions and retry operation. ■ Replace Time-of-Day Clock battery. ■ Check or replace Main PCB.
	UUT fails Audio Test (if equipped)	■ Verify instructions and retry operation. ■ Check microphone. ■ Check or replace Main PCB.
	UUT fails Power Failure Recovery Test	■ Verify instructions and retry operation. ■ Check or replace Main PCB.
Leakage Current	Excessive lead-to-lead leakage current	■ Verify instructions and retry operation. ■ Verify test setup and retry test. ■ Check for and remove external leakage current sources in the test setup vicinity. ■ Check, repair, or restore proper AED internal wire routing. ■ Check or replace the Main PCB.

Preventive Maintenance

Periodic maintenance, inspection, and testing of the LIFEPAK 500 AED will help prevent and detect possible electrical and mechanical problems. The Preventive Maintenance section provides instructions recommended by Medtronic Physio-Control Corp. for inspecting, cleaning, and maintaining the LIFEPAK 500 AED. Follow these recommendations to help keep the LIFEPAK 500 AED in proper working condition. Before servicing or repairing the LIFEPAK 500 AED, become familiar with all of the information in this section.

The **Performance Inspection Procedure** (PIP) and **Test and Calibration Procedures** (TCP) are provided in other sections of this electronic service manual.

Preventive Maintenance and Testing Schedule

Product Useful Life

Product Support Policy

Battery Maintenance

AED Cleaning

AED Storage

Preventive Maintenance and Testing Schedule

Introduction

This section contains a maintenance and testing schedule for service personnel. Before servicing or repairing the LIFEPAK 500 AED, service personnel should become familiar with all of the information in this electronic service manual. Periodic maintenance, inspection, and testing of the Unit will help prevent possible electrical and mechanical problems. Performing these procedures will help detect any problems that may occur.

Guidelines

Activity	As Needed	12 Months
PIP	•*	
TCP	•	
Exterior Inspection	•	•
Interior Inspection	•	
Exterior Cleaning	•	•
Interior Cleaning	•	

*In circumstances where extreme vibration or rough treatment is commonplace, an annual PIP may be indicated to help ensure that the AED still meets manufacturer's specifications.

Product Useful Life

During product development, the LIFEPAK 500 AED and subassemblies are subjected to rigorous life testing. This testing and the routine testing and maintenance program recommended in this electronic service manual will help to provide reliable unit operation for many years.

However, both rapid technological changes and the availability of older replacement parts limit the useful life of all modern medical devices. The American Hospital Association suggests a 5-year useful life expectancy for defibrillators (*Estimated Useful Lives of Depreciable Hospital Assets, Revised 1993 Edition*). Similarly, the U.S. Army lists an 8-year life expectancy for defibrillators (technical bulletin: *Maintenance Expenditure Limits for Medical Materiel, TB MED 7 Revision 8 October 1993*). Medtronic Physio-Control Corp. recommends that you adopt an 8-year useful life expectancy for this Unit.

Product Support Policy

Medtronic Physio-Control Corp. provides full technical support and replacement parts for a period of 8 years from the date of shipment from our manufacturing facility. After this 8-year period, Medtronic Physio-Control provides technical support and replacement parts on an as-available basis.

Battery Maintenance

The LIFEPAK 500 AED can be powered by two types of batteries: the LIFEPAK 500 nonrechargeable lithium battery pak and the LIFEPAK 500 rechargeable Sealed Lead-Acid (SLA) battery pak.

Either type of battery may be installed. Follow the guidelines described in this section to help maximize battery life and performance. Use only these Physio-Control Battery Pak batteries with the LIFEPAK 500 AED.

Rechargeable Battery Pak

Nonrechargeable Battery Pak

Recharging a Rechargeable Battery Pak

Receiving New Batteries

Battery Storage

Discharging Nonrechargeable Batteries

Disposing of Nonrechargeable Batteries

Recycling Rechargeable Batteries

Assessing Batteries

Battery Maintenance

Rechargeable Battery Pak

The rechargeable SLA battery pak requires more maintenance than a lithium battery pak because it must be recharged periodically. The SLA battery pak should be recharged monthly or after each use, whichever comes first. SLA battery paks are most appropriate when the LIFEPAK 500 AED is used on a frequent basis and for operators who use the AED with a simulator for training. With an SLA battery pak installed, the LIFEPAK 500 AED automatically turns on and tests the battery once a week as part of the test. To check the battery level, turn on the AED and check for battery fault indications. Do not check the status of more than 3 batteries within a 5-minute period. The AED may not accommodate more frequent battery checks.

Note: (LIFEPAK 500 Bipahsic AED with Readiness Display only) The **OK** indication on the Readiness Display is equivalent to **BATTERY OK** on the AED.

SLA battery paks should be replaced every 2 years or after 200 charge cycles, whichever comes first. At room temperature (+20°C or +68°F), a new, fully charged SLA battery pak can deliver approximately 59 discharges at 360 joules, with a minimum of approximately 43 discharges at 360 joules.

To properly maintain SLA battery paks:

- Recharge after each use or once a month, whichever comes first.
- Use only the Physio-Control battery charger designed for use with the LIFEPAK 500 AED. Do not use any other charger.

Battery Maintenance

Rechargeable Battery Pak (continued)

- Recharge until the battery charger charge LED is green. This indicates that the battery charger has completed the fast-charge cycle. Under charging can cause battery damage.
- Recharge only at temperatures between +15° and +35°C (+59° and +95°F).
- Do not expose battery paks to temperatures greater than +50°C (+122°F).
- Do not allow electrical connection between the battery contacts.

WARNING!

Possible loss of power during patient care. Using an improperly maintained battery to power the LIFEPAK 500 AED may cause premature power loss. Use only the LIFEPAK 500 AED battery charger to charge the LIFEPAK 500 rechargeable battery pak.

CAUTIONS!

Possible battery damage. Recharge the battery until the battery charger charge LED is green. Under charging can cause battery damage.

Possible battery damage. Charging batteries outside the temperature range of +15° to +35°C (+59° to +95°F) may cause improper charging and shorten battery life.

Possible battery damage. Electrical connection between battery contacts can blow an internal fuse and permanently disable the battery.

Battery Maintenance

Nonrechargeable Battery Pak

The nonrechargeable lithium battery pak requires less maintenance than the SLA battery pak since it never requires recharging. With the lithium battery pak installed, the LIFEPAK 500 AED automatically turns on to test the battery once every two weeks as part of an Auto Test.

To check the battery level, turn on the AED for at least 10 seconds and check for battery fault indications. Do not check the status of more than 3 batteries within a 5-minute period. The AED may not accommodate more frequent battery checks.

Note: (LIFEPAK 500 Bipahsic AED with Readiness Display only.) The **OK** indication on the Readiness Display is equivalent to **BATTERY OK** on the AED.

A new lithium battery pak has a shelf life of 5 years if stored at the proper temperature. At room temperature (+20°C or +68°F), a new lithium sulphur dioxide battery pak can typically deliver 312 discharges at 360 joules, with a minimum of 230 discharges at 360 joules. A new lithium manganese dioxide battery pak can typically deliver 416 discharges at 360 joules, with a minimum of 306 discharges at 360 joules.

A new lithium sulphur dioxide battery will deliver approximately 14 hours of unit operation and a new lithium manganese dioxide battery will deliver approximately 18 hours of unit operation. Frequent routine testing/training on the unit with either lithium battery will prematurely deplete the battery. Although a lithium battery may be stored for up to 5 years (4 years in airline service), it self-discharges over time.

Battery Maintenance

Nonrechargeable Battery Pak (continued)

All personnel should familiarize themselves with the nonrechargeable battery information in the LIFEPAK 500 AED **Operating Instructions**.

To properly maintain nonrechargeable lithium battery paks:

- Do not attempt to recharge (lithium battery paks cannot be connected to the battery charger used to recharge the rechargeable SLA battery paks).
- Do not use beyond the expiration date marked on the battery label.
- Do not expose to temperatures greater than +50°C (+122°F).
- Do not allow electrical connections between the battery contacts.

WARNING!

Possible explosion, fire, or noxious gas. Attempting to recharge a LIFEPAK 500 nonrechargeable lithium battery pak can cause an explosion or fire or release noxious gas. Dispose of expired or depleted lithium battery paks as described in these maintenance instructions.

CAUTION!

Possible battery damage. Electrical connection between battery contacts can blow an internal fuse and permanently disable the battery.

Battery Maintenance

Recharging a Rechargeable Battery Pak

The battery charger fully charges a connected SLA battery within 10 hours. The charger applies a high-level, fast charge for the first 10 hours that the battery is connected. If the battery remains connected, the battery charger applies a low-level trickle-charge to maintain a full charge.

To charge a battery:

1. Connect the battery charger to an appropriate ac power source (100 to 240 Vac, 50 or 60 Hz).
2. Connect the battery to the battery charger.
3. Confirm that the CHARGE LED is amber. This indicates that the battery charger is applying a fast charge.
4. Wait at least 10 hours. Then, confirm that the CHARGE LED is green. The green LED indicates that the fast-charge cycle is complete and that the battery is receiving a trickle-charge to maintain full charge.
5. Disconnect the battery.

Battery Maintenance

Recharging a Rechargeable Battery Pak (continued)

WARNING!

Possible loss of power during patient care. Using an improperly maintained battery to power the LIFEPAK 500 AED may cause premature power loss. Use only the LIFEPAK 500 AED battery charger to charge the LIFEPAK 500 rechargeable battery pak.

A fully charged battery is not harmed if it remains connected to the battery charger. However, if a battery is disconnected and then reconnected, the battery charger begins the 10 hours of fast charge again. Additional battery fast-charge cycles, without discharging, can reduce battery life.

Battery Maintenance

Receiving New Batteries

Prior to installation, you must handle new LIFEPAK 500 nonrechargeable and rechargeable battery paks properly. Refer to the guidelines below.

For LIFEPAK 500 nonrechargeable lithium battery paks:

- Store at temperatures between 0° and +35°C (+32° and +95°F).
- Do not remove the battery pak from the sealed package until you are ready to install it.
- Immediately after you install a new battery pak, perform the LIFEPAK 500 AED automatic capacity check, described in the **Nonrechargeable Battery Pak** section of this electronic service manual.

For LIFEPAK 500 rechargeable SLA battery paks:

- Store at temperatures between 0° and +35°C (+32° and +95°F).
- Charge stored rechargeable battery paks before using the AED.
- Recharge stored rechargeable battery paks at least once per month.
- Immediately after you install a new battery pak, perform the LIFEPAK 500 AED automatic capacity checks, described in the **Rechargeable Battery Pak** section of this electronic service manual.

Battery Maintenance

Battery Storage

The LIFEPAK 500 AED can be powered by two types of batteries. Each requires special handling procedures for storage and return to use.

Store the LIFEPAK 500 nonrechargeable lithium battery pak:

- In temperatures between 0° and +35°C (+32° and +95°F)
- Inside its sealed package until ready for use

Store the LIFEPAK 500 rechargeable SLA battery pak:

- In temperatures between 0° and +35°C (+32° and +95°F)
- Recharge the stored rechargeable battery pak once a month
- Charge the stored rechargeable battery pak before returning it to active use

WARNING!

Possible loss of power during patient care. Stored batteries lose charge. Failure to charge a rechargeable battery pak before use may cause premature AED power loss. Always charge a stored rechargeable battery pak before returning it to active service.

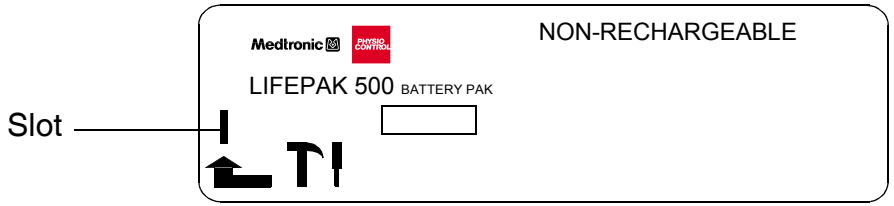
Battery Maintenance

Discharging Nonrechargeable Batteries

Before disposing of nonrechargeable lithium battery paks, make sure that they are fully discharged. To discharge a lithium battery pak, follow this procedure:

1. Place the battery pak with the label side up on a firm, flat surface such as a table top or floor.

2. Locate the slot graphic on the corner marked by the arrow:



3. Place the tip of a flat-bladed screwdriver on the slot.

4. Using a hammer, strike a moderate blow straight down on the top of the screwdriver handle. Make sure that the tip of the screwdriver breaks the label and penetrates approximately 3 mm (1/8 inch). This will strike an internal pin, initiate full discharge, and permanently disable the battery.

5. Set the battery pak aside. Wait for at least one week to make sure the battery pak is fully discharged before disposing.

Battery Maintenance

Disposing of Nonrechargeable Batteries

After fully **discharging a nonrechargeable lithium battery pak**, dispose of the battery pak. Follow your national, regional, and local regulations for disposal. Contact a local Medtronic Physio-Control representative for more information.

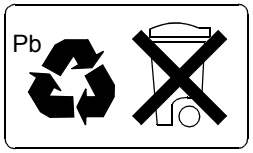
In the U.S., Environmental Protection Agency and Department of Transportation regulations allow disposal of lithium batteries with ordinary household waste provided that they are fully discharged. Regulations may differ in other countries. Be sure to comply with any other local or regional regulation before disposal. For more information or assistance, contact your local Medtronic Physio-Control representative. In the U.S., call Medtronic Physio-Control Technical Services at 1.800.442.1142.

Battery Maintenance

Recycling Rechargeable Batteries

Recycle SLA battery paks locally according to national, regional, and local governmental regulations. If recycling is not possible, contact a Medtronic Physio-Control representative for information or assistance. In the U.S., call 1.800.442.1142.

To promote awareness of battery recycling, SLA battery paks are marked with this label:



Battery Maintenance

Assessing Batteries

Battery management is a critical part of maintenance for reliability. Because power consumption occurs over time, operators must keep records of battery history and condition and must have access to spare, fully charged batteries.

Condition	Suggested Action
1. Battery has been replaced	Go to 3.
2. Battery status unknown	Go to 3.
3. Charge takes more than 2 seconds	Perform battery test during charge.
4. AED is charged too much to run battery test	Leave AED on for 20 minutes. Place AED in operating mode (patient care, service, test, etc.). Check until charge is down and then conduct battery test.
5. Battery status is LOW (LED lights)	Change battery in AED; charge rechargeable battery.
6. Battery status is REPLACE (LED flashes)	Change battery in AED; charge rechargeable battery.

AED Cleaning

Tools and Materials

The tools and materials that you will need to perform an external and internal cleaning of the LIFEPAK 500 AED are listed below.

Product	Description
Static discharge protected work area	Grounded conductive surface and wrist strap (for internal cleaning)
Isopropyl alcohol	
Soap and water	
Quaternary ammonium compounds	
Peroxide (peracetic acid) solutions	
Cotton swabs	
Vacuum cleaner	
Soft-bristle brush	Nonmetallic
Cloth	Clean and lint-free
Compressed air	Clean and dry (60 psi, max.)

AED Cleaning

External Cleaning Procedures

Clean the exterior of the LIFEPAK 500 AED by wiping the surface with any of the following solutions:

- Soap and water
- Quaternary ammonium compounds
- Isopropyl alcohol
- Peroxide (peracetic acid) solutions

WARNING!

Shock or fire hazard. Do not immerse or soak any portion of this AED in water or any other fluid. Avoid spilling any fluid on the AED or accessories.

CAUTION!

Possible case damage. Do not use bleach, bleach dilution, or phenolic compounds. Do not steam or gas sterilize. Do not autoclave this AED.

AED Cleaning

Internal Cleaning Procedures

Clean the interior of the LIFEPAK 500 AED as described below.

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling.

1. Brush interior surfaces and parts with a nonmetallic, soft-bristle brush.
2. Remove loosened dirt and dust using a dry, low-pressure compressed (60 psi) air or vacuum cleaner.
3. Wipe metal surfaces with a soft, nonabrasive cloth that has been dampened with isopropyl alcohol.

AED Storage

When the LIFEPAK 500 AED is not in service, follow these recommendations for storage of the AED with a rechargeable or nonrechargeable battery pak installed:

- Store the AED with a battery pak at temperatures between 0° and +35°C (+32° and +95°F).

When the LIFEPAK 500 AED is not in service, follow these recommendations for storage of the AED without an installed battery pak:

- Store the AED without a battery pak at temperatures between -32° and +65°C (-26° and +149°F).

Replacement Procedures

This section is organized with links to related procedures. Click the link below (highlighted in blue) to jump to the task you wish to accomplish. Then follow the related procedures in order. Be sure to perform the intermediate steps and observe the precautions for preventing electric shock and protecting electrostatic-discharge-(ESD) sensitive components.

Practices and Precautions

Introduction

Warnings and Cautions

Electrostatic-Sensitive Device Handling

Discharging Energy Storage Capacitor

Building a Capacitor Discharge Tool

Recording User-Defined Setups

Restoring User-Defined Setups

Disassembling, Reassembling, and Replacing Components

Replacement Procedures for LIFEPAK 500 Monophasic AED

Replacement Procedures for LIFEPAK 500 Biphasic AED

Operating System Software

Replacement Procedures for LIFEPAK 500 Monophasic AED

Removing Top Cover

Reassembling Case

Replacing Case

Preparing Top Cover for Replacement

Preparing Lower Case for Replacement

Replacing Time-of-Day Clock Battery

Replacing Keypad Overlay

Replacing a Main PCB Switch Cap

Removing Main PCB—Monophasic AED

Replacing Main PCB—Monophasic AED

Installing Main PCB—Monophasic AED

Removing Energy Storage Capacitor—Monophasic AED

Replacing Wave Shaping Inductor—Monophasic AED

Replacing Battery Plate Wire Harness

Replacing Speaker Assembly

Replacing Patient Connector Harness—Monophasic AED

Replacing Lower Enclosure Perimeter Seal

Replacing Lower Case Corner and Patient Connector Door

Replacement Procedures for LIFEPAK 500 Biphasic AED

Removing Top Cover

Reassembling Case

Replacing Case

Preparing Top Cover for Replacement

Preparing Lower Case for Replacement

Replacing Time-of-Day Clock Battery

Replacing Keypad Overlay

Replacing Readiness Display—Biphasic AED

Replacing a Main PCB Switch Cap

Removing Main PCB—Biphasic AED

Replacing Main PCB—Biphasic AED

Installing Main PCB—Biphasic AED

Removing Biphasic PCB—Biphasic AED

Replacing Biphasic PCB—Biphasic AED

Installing Biphasic PCB—Biphasic AED

Removing Energy Storage Capacitor—Biphasic AED

Replacing Inductive Resistor—Biphasic AED

Replacing Battery Plate Wire Harness

Replacing Speaker Assembly

Replacing Patient Connector Harness—Biphasic AED

Replacing Lower Enclosure Perimeter Seal

Replacing Lower Case Corner and Patient Connector Door

Introduction

The Replacement Procedures are a set of detailed instructions for disassembly, handling, and reassembly of replaceable LIFEPAK 500 AED assemblies. The procedures apply to both the LIFEPAK 500 Monophasic AED and LIFEPAK 500 Biphasic AED, with differences between the two models specifically noted.

Whenever the LIFEPAK 500 AED case must be opened for service, be sure to observe precautions for preventing shock and protecting electrostatic-discharge-sensitive components. Review **Warnings and Cautions** before proceeding.

Inspect the exterior of the LIFEPAK 500 AED for improper mechanical function and bent, broken, or corroded connectors or pins. Pick up and turn over the AED and listen for loose or rattling hardware. Locate any loose or rattling hardware and tighten or replace it.

When disconnecting cables and wire harnesses, label the cables and connections so that they match easily during reassembly (e.g., J1, J3, etc.). Each “P” connection mates to a corresponding “J” connector with the same number. For example, P3 mates with J3. Refer to the **LIFEPAK 500 AED Interconnection Diagram—Monophasic AED** or **LIFEPAK 500 AED Interconnection Diagram—Biphasic AED** for additional connection information.

Warnings and Cautions

The following general warnings and cautions apply to all actions you may perform during maintenance of the LIFEPAK 500 AED. Other, more specific, warnings and cautions appear throughout this electronic service manual.

WARNING!

Shock hazard. Servicing of this AED must be performed by properly trained individuals. This AED may retain potentially lethal charges accessible inside the AED at any time–even when off. Follow the procedures carefully for discharging the Energy Storage Capacitor, and disabling Auto Battery Test.

Shock hazard. The Energy Storage Capacitor carries high voltage up to several hours after charging. Remove the battery and discharge the capacitor manually before proceeding to access internal components.

Possible shock and AED damage. Unless reassembled properly, it is possible to pinch and damage wires during reassembly. To avoid pinching wires, carefully follow reassembly instructions.

CAUTION!

Possible component damage. The Main PCB assembly contains static sensitive devices (SSDs). To avoid damage, observe the special handling practices described in the section titled Static Sensitive Device Handling.

Electrostatic-Sensitive Device Handling

Electronic semiconductor devices (such as MOS ICs, FETs, optical isolators, and film resistors) can be damaged by the discharge of static electricity. Static charge buildup is very common; a static discharge commonly occurs when a person wearing synthetic clothing transfers a charge to an object touched. Such a discharge can damage or destroy a Static-Sensitive Device (SSD). In most cases, a discharge is not perceptible to the person who causes it.

To prevent static discharge damage to SSDs, observe the following precautions during any open-case test, maintenance, or repair procedure:

Look for SSD Symbol

Note that SSDs such as the Main PCB are indicated in this electronic service manual with the following warning symbol:

Use Static-Dissipative Mats

Always perform repair or maintenance on a static-dissipative mat that is connected to earth ground.

Transport and Store PCBs Properly

Transport and store PCBs in anti-static racks or inside conductive bags. Label the package that contains the PCBs as static-sensitive.

Electrostatic-Sensitive Device Handling

Wear a Wrist Strap

Always wear a conductive wrist strap connected to the mat and to the ground except when working on energized equipment or when discharging high voltage circuits. The strap must be snug enough to make good contact against bare skin.

WARNING!

Shock hazard. Remove the wrist strap when working on energized equipment or when discharging high voltage circuits.

Keep Work Area Static-Free

Keep static-generating products such as styrofoam cups or trays away from the work area. Connect all electrical equipment such as soldering irons and test equipment to ground with a three-prong plug.

Test Work Area Often

Routinely test all the anti-static parts of the work area (mat, straps, cables). Keep a log of the test results.

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage up to several hours after charging. Remove the battery and discharge the capacitor manually before proceeding to access internal components.

Eliminate Potential Discharge

Any time you open the AED case, remove the battery. Carefully follow the **Discharging Energy Storage Capacitor** procedure before using a conductive wrist strap or attempting to service any components.

Discharging Energy Storage Capacitor

Use the Capacitor Discharge Tool to discharge the Energy Storage Capacitor. If you have not already built one, jump to **Building a Capacitor Discharge Tool**.

CAUTION!

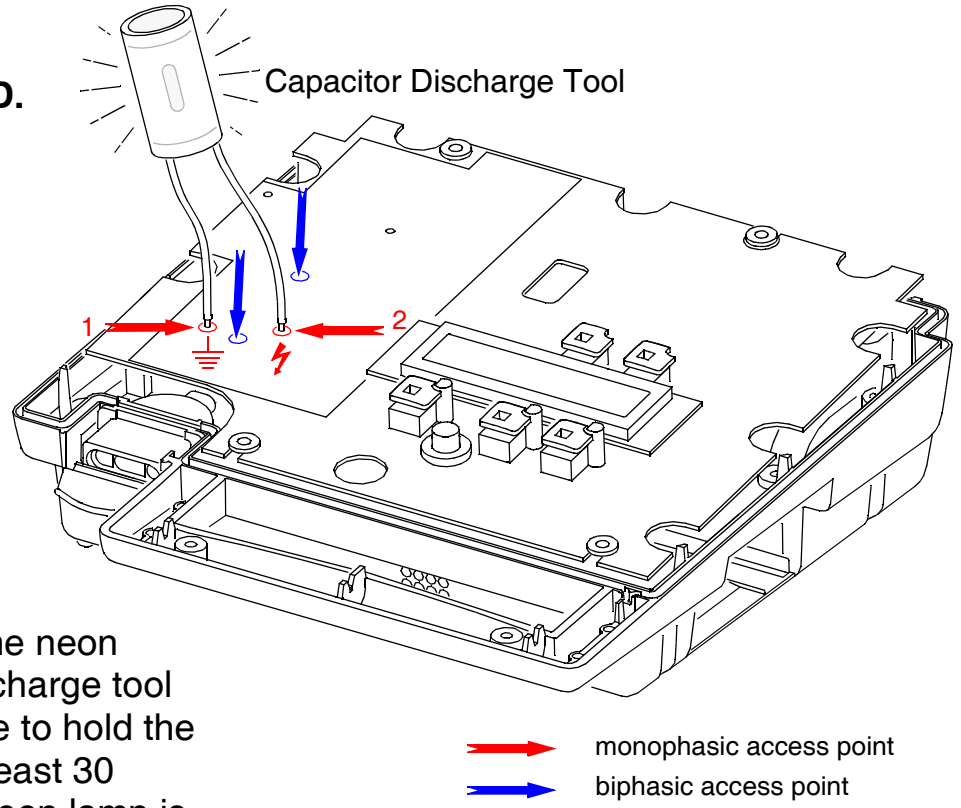
Make sure all power sources are removed from the AED.

To discharge the Energy Storage Capacitor:

LIFEPAK 500 Monophasic AED:
Place and hold one tool probe on the ground point indicated on the Main PCB high-voltage shield (access point 1, indicated in red at right). Place and hold the other tool probe on the high-voltage point indicated on the Main PCB high-voltage shield (access point 2, indicated in red at right).

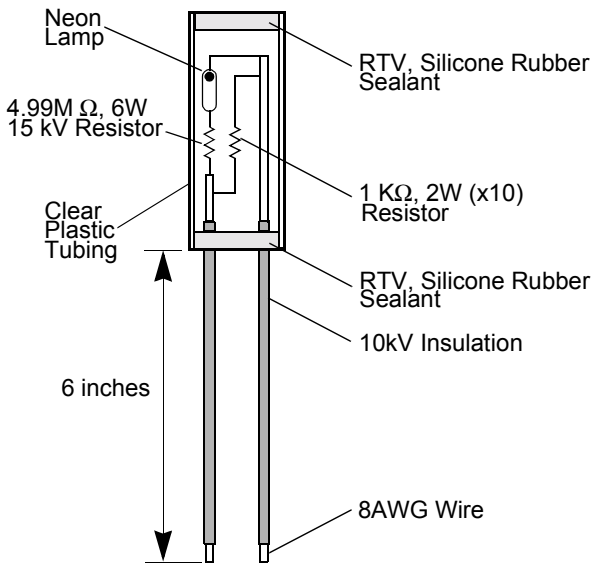
LIFEPAK 500 Biphasic AED:
Polarity is not critical. Place and hold the two tool probes on the access points (indicated in blue at right).

Observe whether the neon lamp inside the discharge tool comes on. Continue to hold the tool in place for at least 30 seconds after the neon lamp is no longer on.



Return to **Removing Top Cover.**

Building a Capacitor Discharge Tool



A Capacitor Discharge Tool can be constructed and used to discharge the Energy Storage Capacitor. The construction of a discharge tool for the LIFEPAK 500 AED is illustrated in the figure to the left. The materials required for the discharge tool is as follows:

LIFEPAK 500 AED discharge tool parts

- (x10) 1 kΩ, 2 W resistor, high-voltage
- 4.99 MΩ, 6 W resistor, high-voltage (15 kV)
- Neon lamp, A1A
- 8 AWG copper wire
- Clear plastic tubing, capable of insulating 10 kV
- 10 kV insulation
- RTV, silicone rubber sealant

After you have built a Capacitor Discharge Tool, continue to the **Discharging Energy Storage Capacitor** procedure.

Recording User-Defined Setups

Operating system versions through 4.40 require that you restore user-defined and service setups in **SETUP MODE** whenever you reload or upgrade operating system software. With Monophasic version 4.41 and later and all Biphasic operating system versions, the loader program creates a temporary image of setups and restores them when you upgrade software. In some cases, this temporary recording and restoring of setups may be available in a service situation; however, it is imperative that service personnel manually check settings after performing service procedures.

You should record existing user-defined and service setups whenever you intend to replace the Main PCB assembly. Failure to do so will result in loss of user-defined and service setups when the AED is returned to use.

A **User Defined Setups Log Sheet** is provided for your convenience. Print the Defined Setups Log Sheet before recording user-defined setups. Use the Defined Setups Log Sheet to record the setups recovered below.

To record user-defined setups:

1. Make sure the LIFEPAK 500 AED power is off.
2. Hold down the ANALYZE (or MENU), UP ARROW, and RIGHT ARROW keys. Then, press the ON/OFF key. Do not release the ANALYZE (or MENU), UP ARROW, and RIGHT ARROW keys until the **SETUP MODE** message appears.

Recording User-Defined Setups

SETUP MODE
nnnnnnnnnnnnnnnnnn

3. The AED displays the **SETUP MODE** screen (shown at the left). The string **nnnnnnnnnnnnnnnnnn** appears at the top of a printed report and can be used as a verification of some of the setup and service settings.
4. Press the ANALYZE (or MENU) key to advance to the **DEVICE ID** screen. Record the device ID.
5. Press the ANALYZE (or MENU) key to advance to the **MODEM PHONE NUMBER** screen. Record the modem phone number.
6. Press the ANALYZE (or MENU) key to advance to the **MODEM SELECTION** screen. Record the modem selection.
7. Press the ANALYZE (or MENU) key to advance to the **MODEM INIT STRING** screen. Record the modem init string, if applicable.

   Note: The **MODEM INIT STRING** only displays for a modem selection of 0.
8. Press the ANALYZE (or MENU) key to advance to the **ENERGY SEQUENCE** screen. Record the energy sequence value.
9. Press the ANALYZE (or MENU) key to advance to the **ENERGY PROTOCOL** screen. Record the energy protocol setting.
10. Press the ANALYZE (or MENU) key to advance to the **DISPLAY ENERGY** screen. Record the display energy setting.

Recording User-Defined Setups

11. (3-button models only:) Press the ANALYZE key to advance to the **AUTO ANALYZE** screen. Record the auto analyze setting.

12. Press the ANALYZE (or MENU) key to advance to the **CPR TIME** screen. Record the CPR time value. (With monophasic version 4.33 and later and all biphasic operating system software, record **CPR TIME 1** and **CPR TIME 2**.)

13. (Monophasic operating system version 4.2 and later/all biphasic versions:) Press the ANALYZE (or MENU) key to advance to the **CPSS DURING CPR** screen. Record the CPSS During CPR setting.

    Note: The CPSS During CPR option should always be set to **OFF** unless authorized by the Medical Director of the controlling institution.

14. Press the ANALYZE (or MENU) key to advance to the **MOTION DETECTION** screen. Record the motion detection setting.

    Note: The motion detection option should always be set to **ON** unless authorized by the Medical Director of the controlling institution.

15. (Monophasic operating system version 4.33 and later/all biphasic versions:) Press the ANALYZE (or MENU) key to advance to the **ASYSTOLE DETECTOR** screen. Record the asystole time setting.

    Note: The asystole detector option should always be set to **OFF** unless authorized by the Medical Director of the controlling institution.

Recording User-Defined Setups

16. (Units enabled for recording only.) Press the ANALYZE (or MENU) key to advance to the **AUDIO RECORDING** screen. Record the value.
17. (Monophasic operating system version 4.2 and later/all biphasic versions:) Press the ANALYZE (or MENU) key to advance to the **PAPER SIZE** screen. Record the paper size value.
18. (Monophasic operating system version 4.5 and later/all biphasic versions:) Press the ANALYZE (or MENU) key to advance to the **INCIDENT ID** screen.
19. (Monophasic operating system version 4.2 and later/all biphasic versions:) Press the ANALYZE (or MENU) key to advance to the **TRANSFER SETUP** screen.
20. Turn off the LIFEPAK 500 AED.
21. Unplug all components connected to the LIFEPAK 500 AED patient connector.
22. Place the AED in **Service Mode**.
23. Notice that the AED displays the **AUTO BATTERY TEST** screen. This option should always be set to **ON** when the AED is in active service.
24. Press the ANALYZE (or MENU) key to advance to the **FAULT CODE** screen. Record each fault code and the time it occurred.

Recording User-Defined Setups

SHOCK COUNTER
XXXXX/YYYYY ZZZJ

25. Press the ANALYZE (or MENU) key to advance to the **SHOCK COUNTER, 360 J** screen. Record both shock tallies for the 360 J energy setting (**XXXXX** represents the number of shocks since the last counter reset, **YYYYY** represents the number of shocks since the unit was built, and **ZZZ** represents the energy setting). Press the UP ARROW key to view and record the shock tallies for the remaining energy settings.

HOURS
XXXXX/YYYYY

26. Press the ANALYZE (or MENU) key to advance to the **HOURS** screen. Record both hours values (**XXXXX** represents the number of hours since the last hour meter reset and **YYYYY** represents the number of hours since the unit was built).
27. Press the ANALYZE (or MENU) key to advance to the **SERIAL NUMBER** screen. Record the serial number.
28. (Monophasic AED, operating system 4.42 or earlier only:) Press the ANALYZE (or MENU) key to advance to the **DASH NUMBER** screen. Record the dash number.
29. Turn off the LIFEPAK 500 AED.

After recording the user-defined and service setups, turn off the AED. Continue to the **Removing Top Cover** procedure to resume AED disassembly.

Restoring User-Defined Setups

Restore user-defined and service setups whenever you replace the Main PCB assembly. Use the **User Defined Setups Log Sheet**, if available, to restore user-defined setups.

Note: If the operating system loader is capable of automatically restoring a setup image (possible in situations where the loader could read the AED's flash RAM—monophasic operating system version 4.41 and later; all biphasic versions), it is still important to confirm that setups are properly restored.

Refer to the LIFEPAK 500 **Setup Instructions** for detailed information about observing and re-entering the recorded user-defined setups.

Replacing Case

Application

The case replacement procedure is a composite of procedures for installing a new case and other assemblies as necessary. If you are opening the case simply for access to internal components, jump to **Removing Top Cover**.

Preparation

Before replacing the case, first follow these procedures:

- **Removing Top Cover**

WARNINGS!

Shock hazard. Servicing of this AED must be performed by properly trained individuals. This AED may retain potentially lethal charges accessible inside the AED at any time–even when off. Follow procedures carefully for discharging the Energy Storage Capacitor and disabling Auto Battery Test.

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling.

- **Discharging Energy Storage Capacitor**

CAUTION!

Possible component damage. The Main PCB assembly contains static sensitive devices (SSDs). To avoid damage, observe the special handling practices described in the section titled Electrostatic-Sensitive Device Handling.

Replacing Case

The procedure for replacing the case is a composite of the following procedures. It is recommended that you perform them in the order given.

Note: The procedures overlap to some degree. In the course of following the procedures, you can replace assemblies as needed.

1. **Preparing Lower Case for Replacement**
2. **Preparing Top Cover for Replacement**
3. **Removing Main PCB—Monophasic AED** or **Removing Main PCB—Biphasic AED**
4. **Replacing Battery Plate Wire Harness**
5. **Replacing Speaker Assembly**
6. **Replacing Wave Shaping Inductor—Monophasic AED** or **Replacing Inductive Resistor—Biphasic AED**
7. **Removing Energy Storage Capacitor—Monophasic AED** or **Removing Energy Storage Capacitor—Biphasic AED**
8. **Replacing Patient Connector Harness—Monophasic AED** or **Replacing Patient Connector Harness—Biphasic AED**
9. **Replacing Lower Enclosure Perimeter Seal**
10. **Removing Biphasic PCB—Biphasic AED**

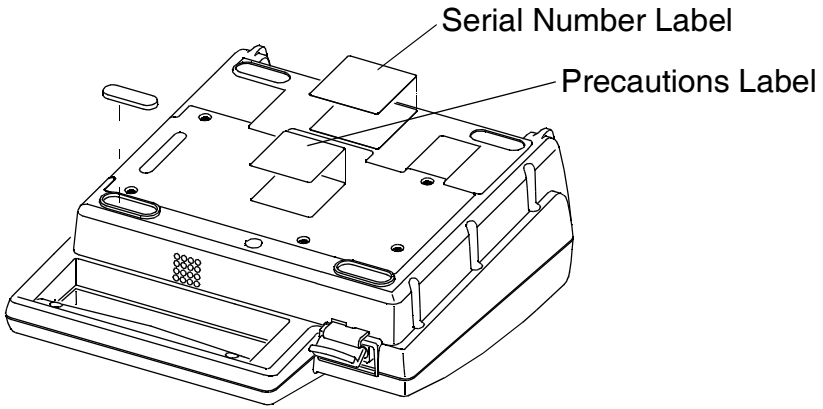
Preparing Lower Case for Replacement

Application

Case replacement requires preparation of the lower case with labels and other hardware prior to installation of major components.

To prepare the lower case:

1. Clean the adhesive mating surfaces for the serial number label, precautions label, mounting feet, and speaker felt with isopropyl alcohol. Allow the surfaces to dry completely.
2. Install the new serial number label, precautions label, and four new feet as shown below. Install two pieces of new speaker felt.
3. Proceed to **Replacing Lower Case Corner and Patient Connector Door**.



Preparing Top Cover for Replacement

Application

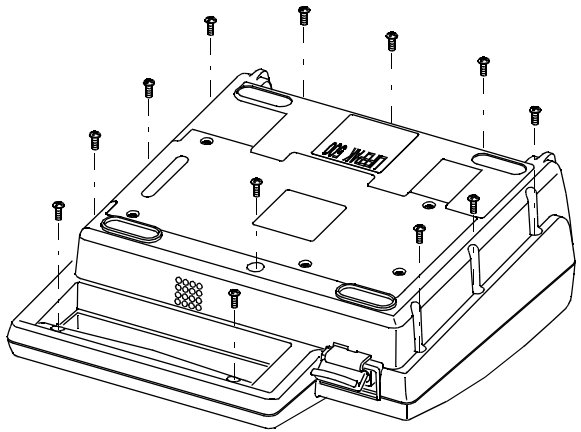
Case replacement requires preparation of the top cover with labels and other hardware prior to installation of major components.

To prepare the top cover:

1. Clean the adhesive mating surfaces for the keypanel and the warning/danger labels with isopropyl alcohol. Allow the surfaces to dry completely.
2. Install the LCD shield. Do not touch the visible surfaces of the shield.
3. Install the keypanel label into the top cover indexing recess. Press in the label from the center toward the edges. Make sure the keypanel label adheres firmly to the top cover.
4. Install the warning/danger label into the indexing recess at the front of the top cover.
5. Install the Physio icon label into the indexing recess in the lower right-hand corner of the top cover.

Removing Top Cover

Application



Remove the top cover to gain access to internal assemblies. Once you have removed the top cover and discharged the Energy Storage Capacitor, jump to any of the replacement procedures listed on the next page.

To remove the top cover:

1. Turn off the LIFEPAK 500 AED.
2. Remove the battery and turn the AED upside down on a clean surface.
3. Remove and discard the 12 screws that hold the top cover to the lower enclosure as shown at the left. Do not remove the 5 battery plate screws.

   Note: Case screws used in the LIFEPAK 500 AED are designed for one use only. Always use new case screws when reassembling the AED.
4. Return the AED to the upright position and carefully remove the top cover.
5. To ensure safety and protect the AED, proceed next to **Discharging Energy Storage Capacitor**.

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling.

Removing Top Cover

After removing the top cover, perform the procedure **Discharging Energy Storage Capacitor**, or if you have already discharged the capacitor, jump to any of the following procedures:

- **Reassembling Case**
- **Replacing Time-of-Day Clock Battery**
- **Replacing a Main PCB Switch Cap**
- **Replacing Main PCB—Monophasic AED** or **Replacing Main PCB—Biphasic AED**
- **Replacing Battery Plate Wire Harness**
- **Removing Energy Storage Capacitor—Monophasic AED** or **Removing Energy Storage Capacitor—Biphasic AED**
- **Replacing Biphasic PCB—Biphasic AED**
- **Replacing Speaker Assembly**
- **Replacing Wave Shaping Inductor—Monophasic AED** or **Replacing Inductive Resistor—Biphasic AED**
- **Replacing Patient Connector Harness—Monophasic AED** or **Replacing Patient Connector Harness—Biphasic AED**
- **Replacing Lower Enclosure Perimeter Seal**
- **Replacing Lower Case Corner and Patient Connector Door**
- **Replacing Readiness Display—Biphasic AED**

Reassembling Case

To reassemble the case:

1. Verify the switch caps are installed and properly aligned and all wiring is clear of the enclosure and cannot be pinched.
2. Hold the front of the upper enclosure at a 45-degree angle to the front of the lower enclosure, then lower the upper enclosure.
3. Align the three plastic interlocks in the handle of the upper enclosure with the corresponding interlocks in the handle of the lower enclosure and carefully lower the top cover into position.
4. Install 12 new enclosure screws.

Complete the **Test and Calibration Procedures (TCP)**, followed by the **Performance Inspection Procedure (PIP)**, if you replaced any of the following components:

- Case
- Main PCB
- Energy Storage Capacitor
- Wave Shaping Inductor (LIFEPAK 500 Monophasic AED only)
- Battery Cable Harness
- Biphasic PCB (LIFEPAK 500 Biphasic AED only)
- Inductive Resistor (LIFEPAK 500 Biphasic AED only)
- Patient Connector Harness

Reassembling Case

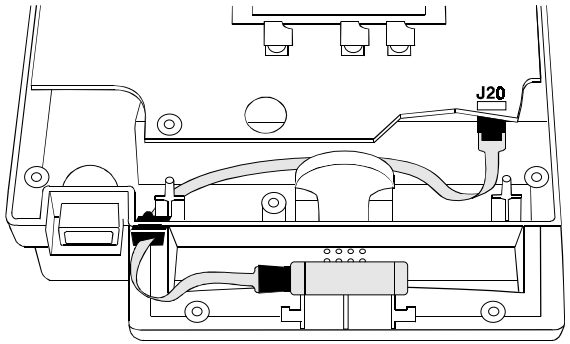
Complete the **Restoring User-Defined Setups** procedure if you replaced the Main PCB.

Complete the **Performance Inspection Procedure (PIP)** if you replaced any of the following components:

- Any of the components that require you to complete the Test and Calibration Procedures (TCP)
- Time-of-Day Clock Battery
- Readiness Display
- Any of the switch caps
- Speaker Assembly
- Lower Enclosure Perimeter Seal

Replacing Readiness Display—Biphasic AED

Preparation



Before replacing the Readiness Display, you must first follow these procedures:

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling.

- **Discharging Energy Storage Capacitor**

Refer to the exploded view at the left. To replace the Readiness Display:

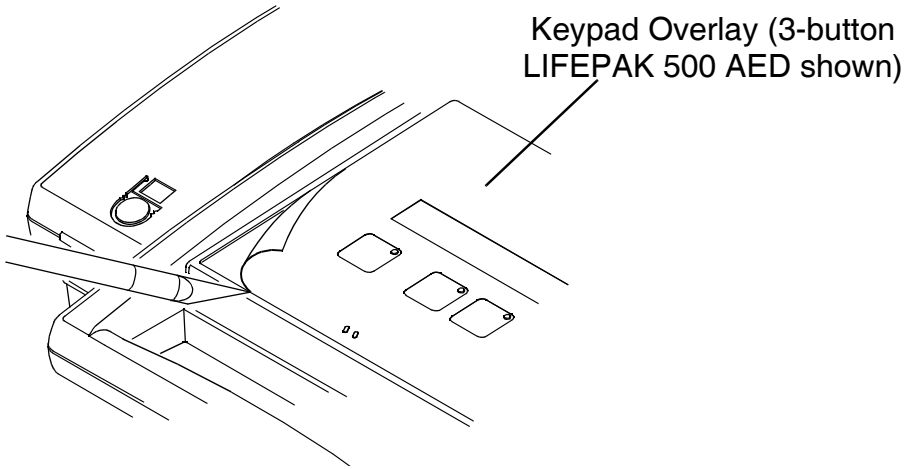
1. Place the AED on the work surface with the handle facing toward you.
2. Observe how the Readiness Display cable is routed in the handle and across the front of the Main PCB. Disconnect P20 of the Readiness Display cable from J20 on the topside of the Main PCB in the right front corner and remove it from the case.
3. Install the replacement Readiness Display, seating it in the indexing recess in the handle, routing the new cable in the handle and across the Main PCB, and connecting P20 to J20 on the Main PCB.

When you have completed the Replacing Readiness Display procedure, jump to the **Reassembling Case** procedure.

Replacing Keypad Overlay

To replace the Keypad Overlay:

1. Use a knife blade to carefully pull up a corner of the keypad overlay.
2. Peel the keypad overlay and the LCD shield away from the upper enclosure.
3. Use a lint-free, alcohol-dampened cloth to remove any residual adhesive on the upper enclosure. Allow the area to completely dry.
4. Install a new LCD shield in the upper case recess, over the LCD.
5. Install the replacement keypad overlay in the top cover indexing recess.



Replacing Time-of-Day Clock Battery

Preparation

Before replacing the Time-of-Day Clock Battery, you must first follow these procedures:

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling.

- **Discharging Energy Storage Capacitor**
- **Setting Aside Main PCB**

To replace the Time-of-Day Clock Battery:

1. Slide out the clock battery and set it aside. Gently press down on the retainer clip to ensure a snug fit for the new clock battery.
2. Slide a new clock battery in place. Observe the battery polarity markers.

WARNING!

Shock hazard. Dangerous voltages will remain on the capacitor for up to several hours after charging, even in normal operation, and therefore the device should always be DISCHARGED manually before uncovering the high voltage section.

Replacing Time-of-Day Clock Battery

3. Jump to the **Reseating Main PCB** procedure, and then return to this procedure.

WARNING!

Shock hazard. Do not touch or make any connections to exposed circuitry except as directed in this electronic service manual.

4. Install a battery in the AED.
5. Turn on the LIFEPAK 500 AED.
6. Verify the AED displays the **CONNECT ELECTRODES** message.

   Note (Monophasic LIFEPAK 500 AED with Operating System Software Version 4.0 Only): If the AED fails to display the **CONNECT ELECTRODES** message, you must perform the **Time-of-Day Clock Battery Recovery** procedure.
7. Turn off the LIFEPAK 500 AED.

When you have completed the Time-of-Day Clock Battery replacement procedure, jump to the **Reassembling Case** procedure.

Replacing a Main PCB Switch Cap

Preparation

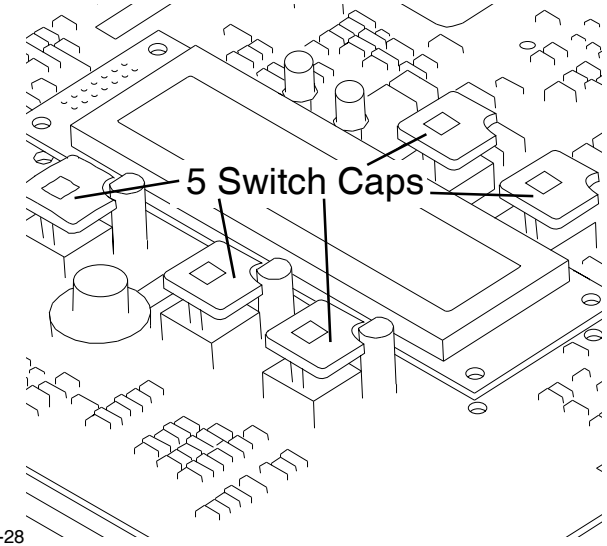
Before replacing any or all of the five switch caps, you must first perform the following procedures:

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**



To replace a switch cap:

1. Hold the top of the switch cap between your forefinger and thumb.
2. Gently pull the switch cap to the side and away from the PCB.
3. Orient the cut-out corner of the new switch cap toward the right-rear corner of the Main PCB. Gently press the switch cap onto the switch plunger until it snaps into place.

When you have completed the switch cap replacement procedure, jump to the **Reseating Main PCB** procedure.

Setting Aside Main PCB

Application

This procedure is for temporarily moving the Main PCB (LIFEPAK 500 Monophasic AED or LIFEPAK 500 Biphasic AED) out of the way to provide access to other components. In these cases, it is necessary to disconnect the speaker leads (P9), and on the Biphasic AED, it is necessary to disconnect the flex cable (P11). If you are installing a new Main PCB, perform **Replacing Main PCB—Monophasic AED** or **Replacing Main PCB—Biphasic AED** instead.

Preparation

Before moving the Main PCB, you must first follow the procedures:

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

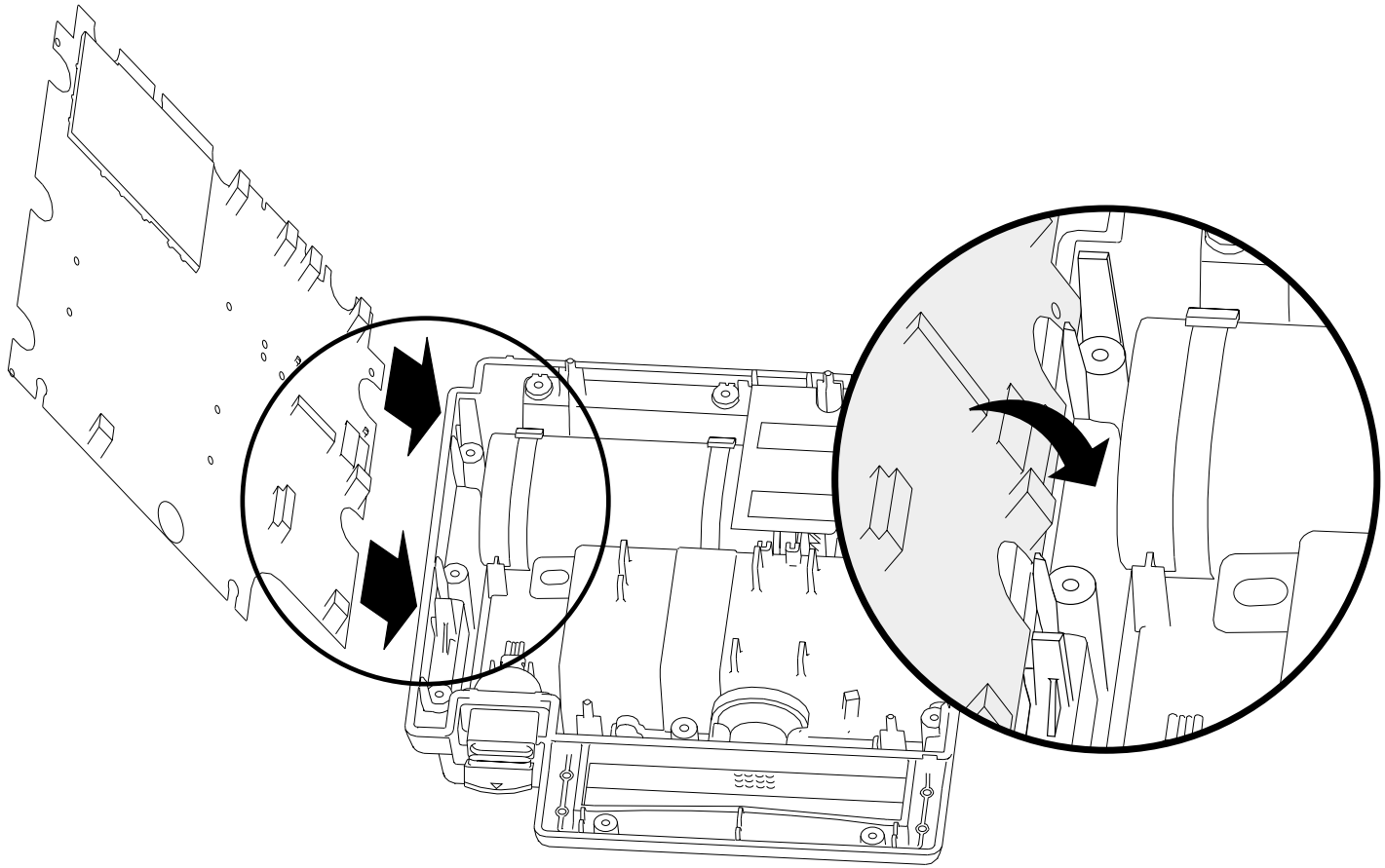
- **Discharging Energy Storage Capacitor**

To move the Main PCB:

1. Place the AED on the work surface with the handle facing forward.
2. Disconnect P9 of the speaker cable from J9 on the right underside of the Main PCB. (LIFEPAK 500 Biphasic AED only): disconnect P11 from J11.
3. Carefully lift the Main PCB off of the four PCB mounts and tilt the board toward the left, exposing the underside of the Main PCB.

Setting Aside Main PCB

4. Without straining the wires, tilt the board on its left edge and slide the edge carefully into the notches in two case-wall ribs.



Setting Aside Main PCB

5. After moving the Main PCB, jump to the appropriate replacement procedure:
   - **Replacing Speaker Assembly**
   - **Replacing Patient Connector Harness—Monophasic AED**
   - **Replacing Patient Connector Harness—Biphasic AED**
   - **Replacing Lower Enclosure Perimeter Seal**
   - **Replacing Time-of-Day Clock Battery**

Reseating Main PCB

Application

The following procedure describes moving the Main PCB back into position when reassembling the LIFEPAK 500 AED. If the Main PCB is completely detached, perform the appropriate procedure:

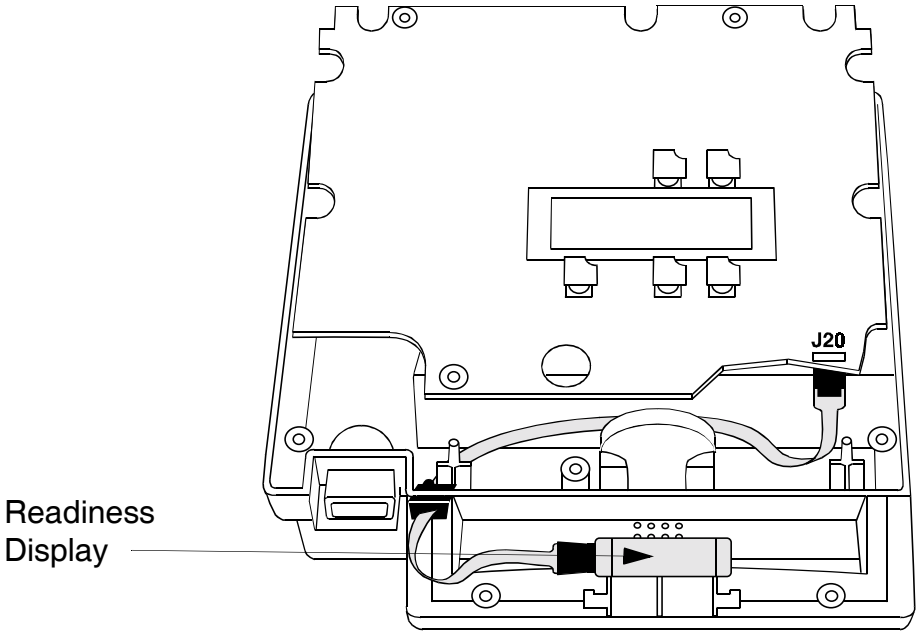
- **Replacing Main PCB—Monophasic AED**
- **Installing Main PCB—Monophasic AED**
- **Replacing Biphasic PCB—Biphasic AED**
- **Installing Main PCB—Biphasic AED**

To reseat the Main PCB:

1. Check mounting grommets on the Main PCB. If any are damaged or missing, replace them from the Main PCB Installation Kit.
2. Check the five switch caps and LCD board on the top side of the Main PCB. If necessary, make adjustments or replace damaged parts from the Main PCB Installation Kit. Check that the battery wire harness is in place.
3. Reconnect P9 of the speaker cable to J9 on the right underside of the Main PCB.
4. (LIFEPAK 500 Biphasic AED only): reconnect P11 of the flex cable to J11.

Reseating Main PCB

5. (LIFEPAK 500 Biphasic AED equipped with Readiness Display only): Check the seating of the Readiness Display, making sure it is snug in the indexing recess in the handle. Route the Readiness Display cable in the handle and across the Main PCB. Reconnect P20 to J20 on the Main PCB.



6. Install the Main PCB onto the four PCB mounts.

After you have installed the Main PCB, jump to the **Reassembling Case** procedure.

Removing Main PCB—Monophasic AED

Application

The following procedure describes removing a Main PCB that you intend to re-install later. If you intend to replace the Main PCB with a new one, perform the **Replacing Main PCB—Monophasic AED** procedure.

Preparation

Before removing the Main PCB, you must first follow the procedures:

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

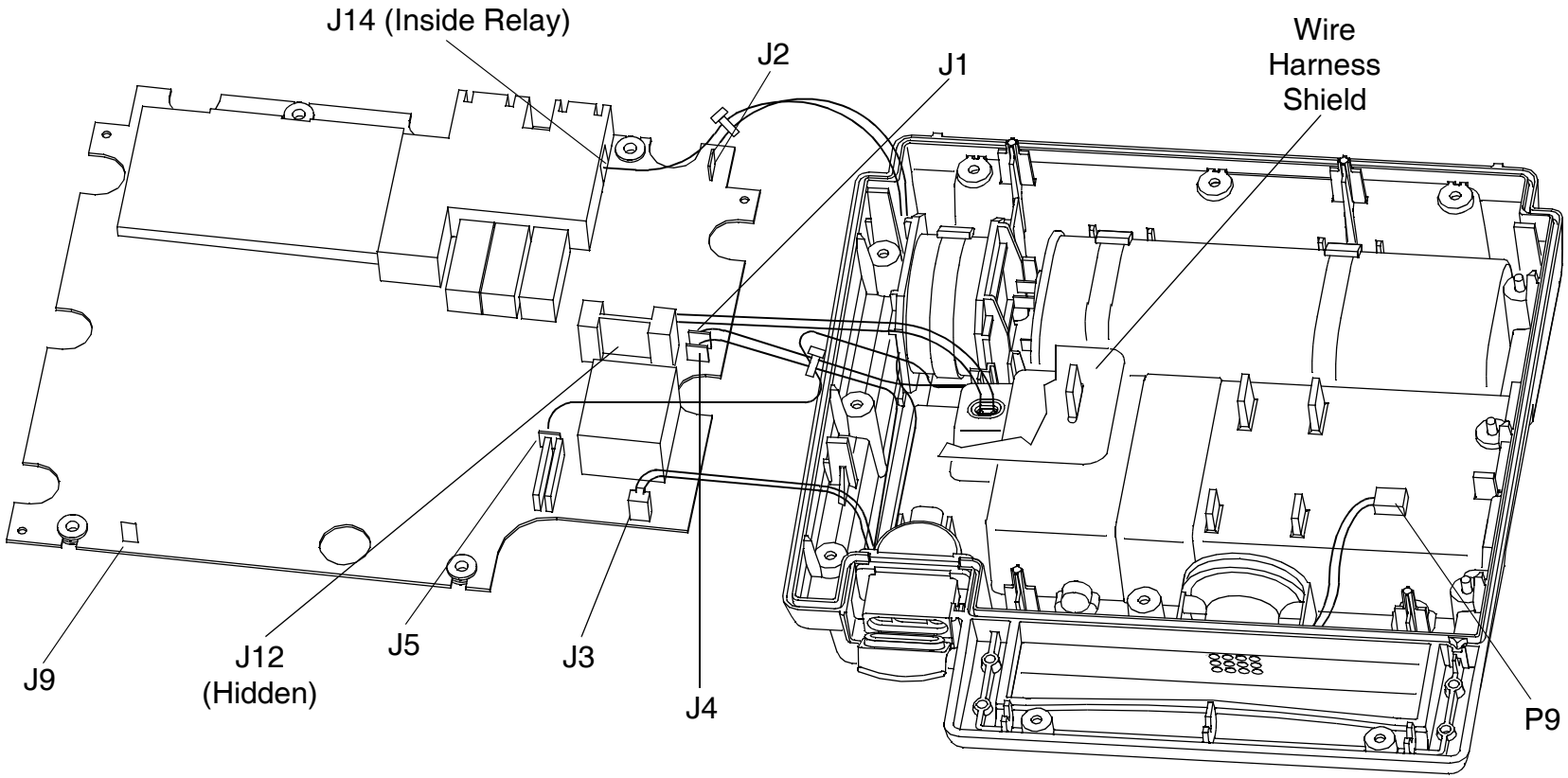
- **Discharging Energy Storage Capacitor**

To remove the Main PCB:

1. Place the AED on the work surface with the handle facing forward.
2. Disconnect P9 of the speaker cable from J9 on the right underside of the Main PCB.
3. Carefully lift the Main PCB off of the four PCB mounts and tilt the board toward the left, exposing the underside of the Main PCB.
4. Disconnect P3 of the serial cable from J3 of the Main PCB.

Removing Main PCB—Monophasic AED

5. Disconnect P12 of the power cable from J12 of the Main PCB.



6. Disconnect the five spade-lugs P1, P2, P4, P5, and P14 from the Main PCB J1, J2, J4, J5, and J14, respectively. Do not pull on the wires.

Removing Main PCB—Monophasic AED

7. Carefully lift out the Main PCB, place it in a static-protective bag, and set it aside.
8. After removing the Main PCB, jump to the appropriate replacement procedure:
   - **Replacing Battery Plate Wire Harness**
   - **Removing Energy Storage Capacitor—Monophasic AED**
   - **Replacing Wave Shaping Inductor—Monophasic AED**
   - **Installing Main PCB—Monophasic AED**

Replacing Main PCB—Monophasic AED

Application

Perform the Main PCB Replacement procedure when you intend to replace the Main PCB with a new one. If you intend to reinstall the same Main PCB, perform the **Removing Main PCB—Monophasic AED** procedure.

Preparation

Before replacing the Main PCB, you must first follow these procedures:

- **Recording User-Defined Setups**

  Note: You must record and restore user-definable setups when you replace the Main PCB. If you are removing the Main PCB to gain access to other components, you do not need to record user-definable setups (see **Removing Main PCB—Monophasic AED**).

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

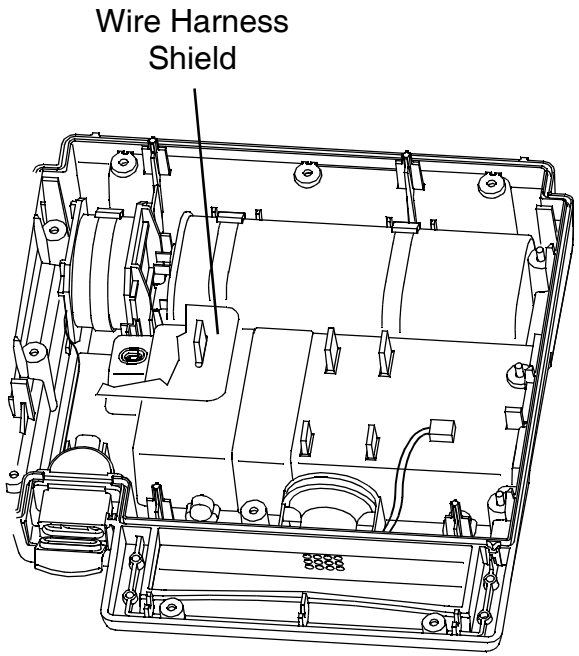
- **Discharging Energy Storage Capacitor**

Replacing Main PCB—Monophasic AED

To replace the Main PCB:

1. Place the AED on the work surface with the handle facing forward.
2. Disconnect P9 of the speaker cable from J9 on the right underside of the Main PCB.
3. Carefully lift the main PCB off of the four PCB mounts and tilt the board toward the left, exposing the underside of the Main PCB.
4. Disconnect P3 of the serial cable from J3 of the Main PCB.
5. Disconnect P12 of the power cable from J12 of the Main PCB.
6. Disconnect the five spade-lugs P1, P2, P4, P5, and P14 from Main PCB J1, J2, J4, J5, and J14, respectively. Do not pull on the wires.
7. Carefully remove the Main PCB and place it in a static-protective bag, and set it aside.
8. If not already present, install four new mounting grommets from the Main PCB Installation Kit onto the replacement Main PCB.
9. If not already present, install five new switch caps from the Main PCB Installation Kit onto the replacement Main PCB.

Replacing Main PCB—Monophasic AED



10. If not already present, install the new high voltage shield and two new rivets from the Main PCB Installation Kit onto the replacement Main PCB.
11. Connect the five spade-lugs P1, P2, P4, P5, and P14 to J1, J2, J4, J5, and J14 of the replacement Main PCB.

Note: It is critical that the wire connected to J5 on the Main PCB is oriented so that it exits the PCB and routes directly down toward the lower case cavity. It is important that the wire does not loop back onto or near the PCB itself.

12. Connect P12 of the power cable to J12 of the replacement Main PCB.
13. Connect P3 of the serial cable to J3 of the replacement Main PCB.
14. Install the wire harness shield as shown at the left.
15. Reposition the Main PCB over the four lower case PCB mounts.
16. Connect P9 of the speaker cable to J9 of the replacement Main PCB.
17. Install the replacement Main PCB onto the four PCB mounts.

After you have installed the replacement Main PCB, jump to the **Reassembling Case** procedure.

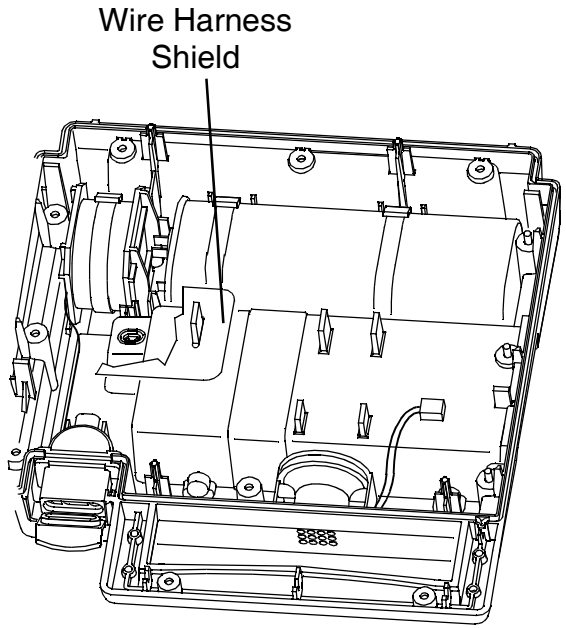
Installing Main PCB—Monophasic AED

Application

The following procedure describes the reinstallation of a Main PCB that was removed to gain access to other AED assemblies. For installation of a new Main PCB assembly in a LIFEPAK 500 Monophasic AED, follow the **Replacing Main PCB—Monophasic AED** procedure.

To install the Main PCB:

1. Connect the five spade-lugs P1, P2, P4, P5, and P14 to the Main PCB J1, J2, J4, J5, and J14.



Note: It is critical that the wire connected to J5 on the Main PCB is oriented so that it exits the PCB and routes directly down toward the lower case cavity. It is important that the wire does not loop back onto or near the PCB itself.

2. Connect P12 of the power cable to J12 of the Main PCB.
3. Connect P3 of the serial cable to J3 of the Main PCB.
4. Install the wire harness shield as shown at the left.
5. Reposition the Main PCB over the four lower case PCB mounts.
6. Connect P9 of the speaker cable to J9 of the Main PCB.
7. Install the Main PCB onto the four PCB mounts.

After you instal the Main PCB, jump to the **Reassembling Case** procedure.

Removing Main PCB—Biphasic AED

Application

The following procedure describes removing a Main PCB that you intend to reinstall later. If you intend to replace the Main PCB of a LIFEPAK 500 Biphasic AED with a new one, perform the **Replacing Main PCB—Biphasic AED** procedure.

Preparation

Before removing the Main PCB, you must first follow these procedures:

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

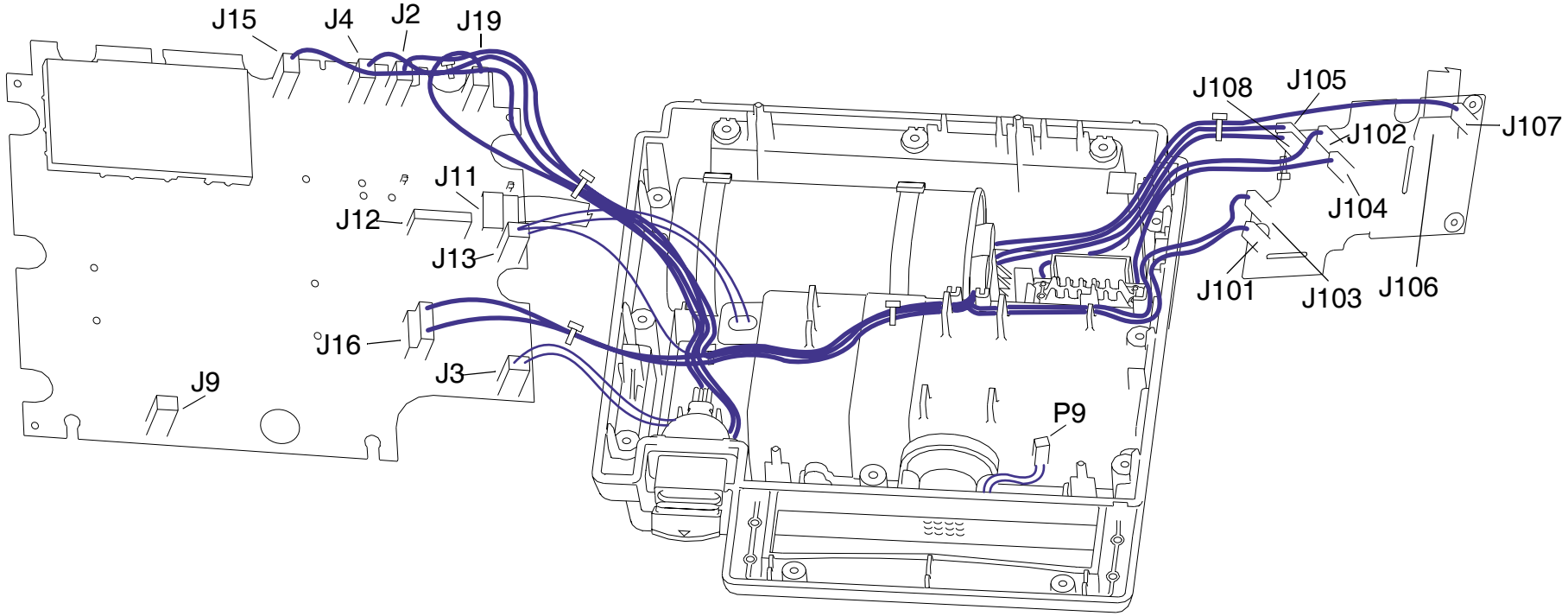
- **Discharging Energy Storage Capacitor**

To remove the Main PCB:

1. Place the AED on the work surface with the handle facing forward.
2. Disconnect P9 of the speaker cable from J9 on the right underside of the Main PCB.
3. LIFEPAK 500 Biphasic AED eqipped with Readiness Display only: Disconnect P20 of the Readiness Display cable from J20 of the Main PCB.

Removing Main PCB—Biphasic AED

4. Carefully lift the Main PCB off of the four PCB mounts and tilt the board toward the left, exposing the underside of the Main PCB.
5. Disconnect P3 of the serial cable from J3 of the Main PCB.
6. Disconnect P12 of the power cable from J12 of the Main PCB.



Removing Main PCB—Biphasic AED

7. Disconnect the four spade-lugs P2, P4, P13, P15, and P19 from Main PCB J2, J4, J13, J15, and J19, respectively. Do not pull on the wires.
8. Disconnect P11 of the data cable from J11 of the Main PCB.
9. Disconnect P16 from J16 on the Main PCB near Relay at J15. Disconnect P19 from J19.
10. Carefully lift out the Main PCB, place it in a static-protective bag, and set it aside.
11. After removing the Main PCB, jump to the appropriate replacement procedure:
    - **Replacing Battery Plate Wire Harness**
    - **Removing Biphasic PCB—Biphasic AED**
    - **Replacing Inductive Resistor—Biphasic AED**
    - **Installing Main PCB—Biphasic AED**

Replacing Main PCB—Biphasic AED

Application

Perform the Main PCB Replacement procedure when you intend to replace the Main PCB with a new one. If you intend to reinstall the same Main PCB, perform the **Removing Main PCB—Biphasic AED** procedure.

Preparation

Before replacing the Main PCB, you must first follow these procedures:

- **Recording User-Defined Setups**

  Note: You must record and restore user-definable setups when you replace the Main PCB. If you are removing the Main PCB to gain access to other components, you do not need to record user-definable setups (see **Removing Main PCB—Biphasic AED**).

- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**

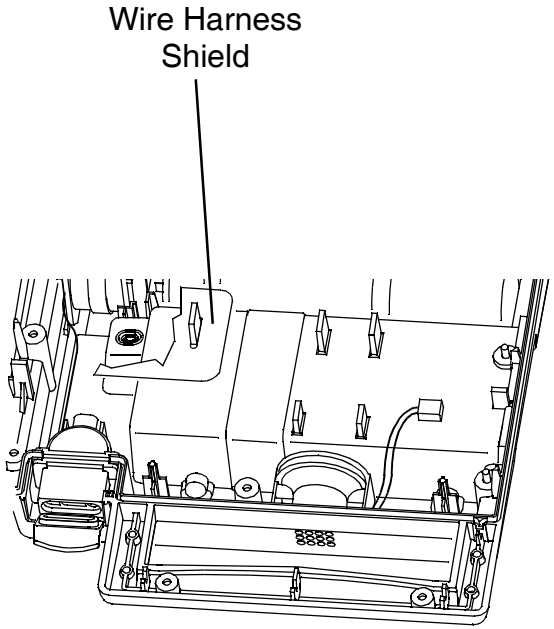
To replace the Main PCB:

1. Place the AED on the work surface with the handle facing forward.
2. Disconnect P9 of the speaker cable from J9 on the right underside of the Main PCB.

Replacing Main PCB—Biphasic AED

3. LIFEPAK 500 Biphasic AED equipped with Readiness Display only: Disconnect P20 of the Readiness Display cable from J20 of the Main PCB.
4. Carefully lift the Main PCB off of the four PCB mounts and tilt the board toward the left, exposing the underside of the Main PCB.
5. Disconnect P3 of the serial cable from J3 of the Main PCB.
6. Disconnect P12 of the power cable from J12 of the Main PCB.
7. Disconnect the four spade-lugs P2, P4, P13, P15, and P19 from Main PCB J2, J4, J13, J15, and J19, respectively. Do not pull on the wires.
8. Disconnect P11 of the data cable from J11 of the Main PCB.
9. Disconnect P16 from J16 of the Main PCB.
10. Carefully remove the Main PCB, place it in a static-protective bag, and set it aside.
11. Select the replacement Main PCB. If mounting grommets are not installed, install new grommets from the Main PCB Installation Kit in the four key slots.
12. If switch caps are not already present, install five new switch caps from the Main PCB Installation Kit onto the replacement Main PCB. Replace or reinstall the Biphasic PCB Shield using double-stick tape, to the metal shield on the underside of the Main PCB.

Replacing Main PCB—Biphasic AED

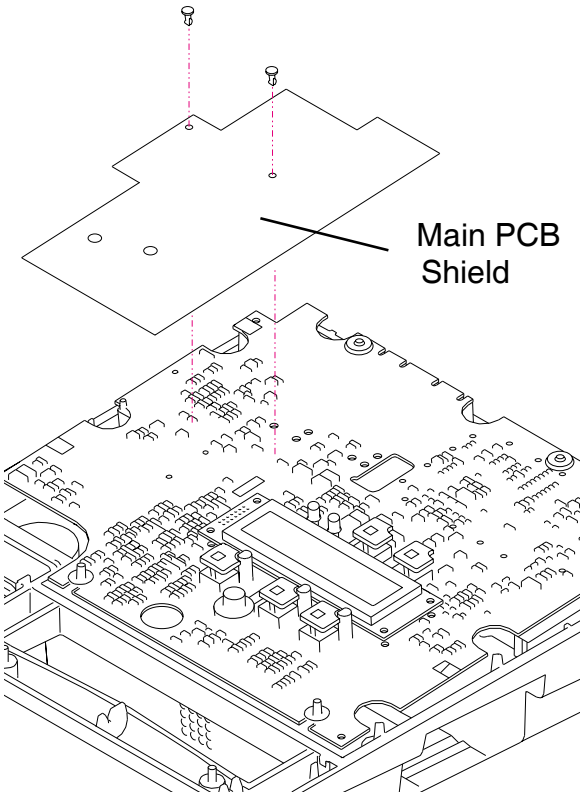


13. If a high voltage shield and rivets are not already present, install a new high voltage shield and two new rivets from the Main PCB Installation Kit onto the replacement Main PCB.
14. Connect P16 to J16 of the replacement Main PCB. Connect P11 of the data cable to J11 of the replacement Main PCB. Connect the five spade-lugs P2, P4, P13, P15, and P19 to J2, J4, J13, J15, and J19, respectively, of the replacement Main PCB. Connect P12 of the power cable to J12 of the replacement Main PCB. Connect P3 of the serial cable to J3 of the replacement Main PCB.
15. Install the wire harness shield as shown at the left.
16. Reposition the Main PCB over the four lower case PCB mounts.
17. Connect P9 of the speaker cable to J9 of the replacement Main PCB.
18. LIFEPAK 500 Biphasic AED eqipped with Readiness Display only: Connect P20 of the Readiness Display cable to J20 of the Main PCB.
19. Install the replacement Main PCB onto the four PCB mounts.

After you have installed the replacement Main PCB, jump to the **Reassembling Case** procedure.

Installing Main PCB—Biphasic AED

Application



The following procedure describes the reinstallation of a Main PCB that was removed to gain access to other AED assemblies. For installation of a new Main PCB assembly, follow the **Replacing Main PCB—Biphasic AED** procedure.

To install the Main PCB:

1. Connect P16 to J16 of the Main PCB. Connect P11 of the data cable to J11 of the Main PCB. Connect the five spade-lugs P2, P4, P13, P15, and P19 to J2, J4, J13, J15, and J19, respectively, of the Main PCB.
2. Connect P12 of the power cable to J12 of the Main PCB.
3. Connect P3 of the serial cable to J3 of the replacement Main PCB.
4. Install the Main PCB shield as shown at the left.
5. Reposition the Main PCB over the four lower case PCB mounts.
6. Connect P9 of the speaker cable to J9 of the Main PCB.
7. LIFEPAK 500 Biphasic AED eqipped with Readiness Display only: Connect P20 of the Readiness Display cable to J20 of the Main PCB.
8. Install the Main PCB onto the four PCB mounts.

After you have installed the Main PCB, jump to the **Reassembling Case** procedure.

Removing Biphasic PCB—Biphasic AED

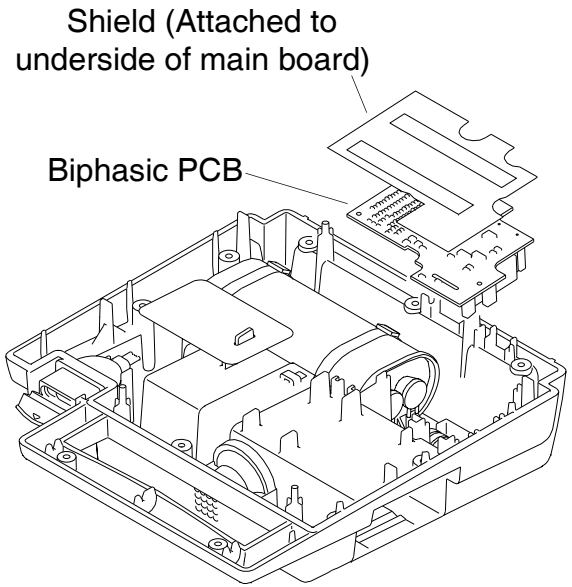
Application

The following procedure describes removing a Biphasic PCB for access to the Inductive Resistor and Energy Storage Capacitor. If you intend to replace the Biphasic PCB with a new one, perform the **Replacing Biphasic PCB—Biphasic AED** procedure.

Preparation

Before removing the Biphasic PCB, you must first follow the procedures:

- **Removing Top Cover**



WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Setting Aside Main PCB** (to gain access to the Inductive Resistor only) or **Removing Main PCB—Biphasic AED** (to gain access to the Inductive Resistor and Energy Storage Capacitor).

To remove the Biphasic PCB:

1. Gently lift the Biphasic PCB out of its well and tilt the front edge up, exposing the underside.

Removing Biphasic PCB—Biphasic AED

2. Disconnect the seven spade-lugs P101, P102, P103, P104, P105, P107, and P108, from J101, J102, J103, J104, J105, J107, and J108, respectively, on the underside of the Biphasic PCB. Do not pull on the wires.
3. Disconnect P106 of the Data Cable from J106 of the Biphasic PCB.
4. Carefully remove the Biphasic PCB and place it in a static-protective bag.
5. After removing the Biphasic PCB, jump to the appropriate replacement procedure:
   - **Replacing Inductive Resistor—Biphasic AED**
   - **Removing Energy Storage Capacitor—Biphasic AED**
   - **Installing Biphasic PCB—Biphasic AED**

Replacing Biphasic PCB—Biphasic AED

Application

Perform the Biphasic PCB Replacement procedure when you intend to replace the Biphasic PCB with a new one. If you intend to reinstall the same Biphasic PCB, perform the **Removing Biphasic PCB—Biphasic AED** procedure.

Preparation

Before replacing the Biphasic PCB, you must first follow these procedures:

- **Recording User-Defined Setups**

  Note: You must record and restore user-definable setups when you replace the Biphasic PCB. If you are removing the Biphasic PCB to gain access to other components, you do not need to record user-definable setups (see **Removing Biphasic PCB—Biphasic AED**).

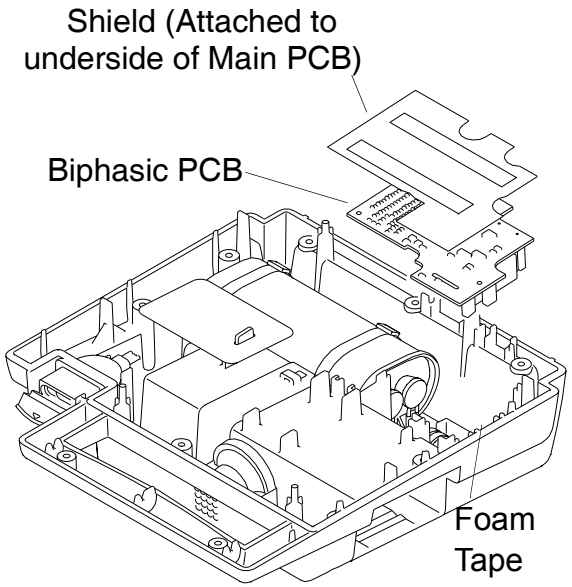
- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Setting Aside Main PCB**

Replacing Biphasic PCB—Biphasic AED



To replace the Biphasic PCB:

1. Gently lift the Biphasic PCB out of its well and tilt the front edge up, exposing the underside.
2. Disconnect the seven spade-lugs P101, P102, P103, P104, P105, P107, and P108, from J101, J102, J103, J104, J105, J107, and J108, respectively, on the underside of the Biphasic PCB. Do not pull on the wires.
3. Disconnect P106 of the Data Cable from J106 of the Biphasic PCB.
4. Carefully remove the Biphasic PCB and place it in a static-protective bag.
5. Select the replacement Biphasic PCB. Connect P106 of the Data Cable to J106 of the replacement Biphasic PCB.
6. Connect the seven spade-lugs P101, P102, P103, P104, P105, P107, and P108, to J101, J102, J103, J104, J105, J107, and J108, respectively, of the replacement Biphasic PCB.
7. Reposition the Biphasic PCB over its well, gently moving and routing wires to seat the Biphasic PCB without interference. The wires under the Biphasic PCB must not lay against the Inductive Resistor coil. The right edge of the Biphasic PCB should compress the foam tape. This helps retain the PCB in position while the Main PCB is seated in position over it.

Jump to the **Reseating Main PCB** procedure.

Installing Biphasic PCB—Biphasic AED

Application

The following procedure describes the reinstallation of a Biphasic PCB that was removed to gain access to other AED assemblies. For installation of a new Biphasic PCB assembly, follow the **Replacing Biphasic PCB—Biphasic AED** procedure.

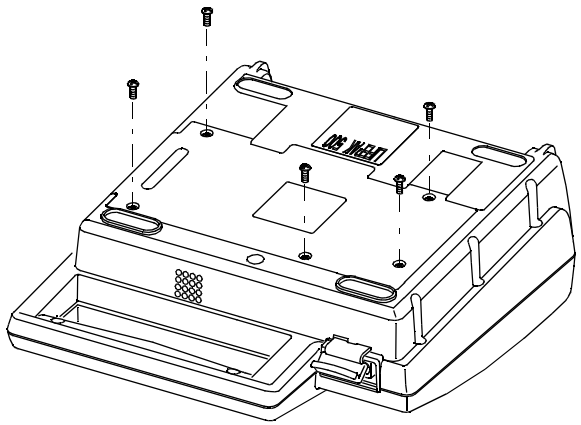
To install the biphasic PCB:

1. Connect P106 of the Data Cable to J106 of the replacement Biphasic PCB.
2. Connect the seven spade lugs P101, P102, P103, P104, P105, P107, and P108, to J101, J102, J103, J104, J105, J107, and J108, respectively, of the replacement Biphasic PCB.
3. Reposition the Biphasic PCB over its well, gently moving and routing wires to seat the Biphasic PCB without pressure against the Inductive Resistor coil or the Biphasic PCB.

Jump to the **Reseating Main PCB** or **Installing Main PCB—Biphasic AED** procedure.

Replacing Battery Plate Wire Harness

Preparation



Before replacing the Battery Plate Wire Harness, you must first follow these procedures:

- **Removing Top Cover**

WARNING!

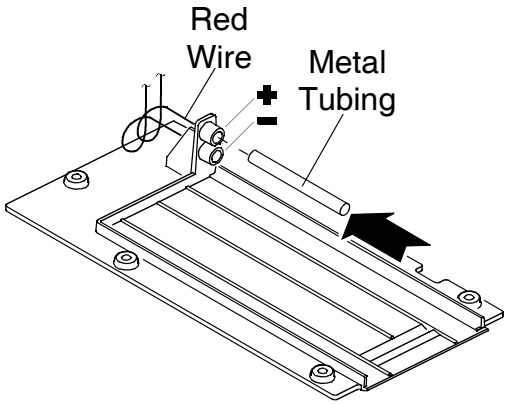
Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

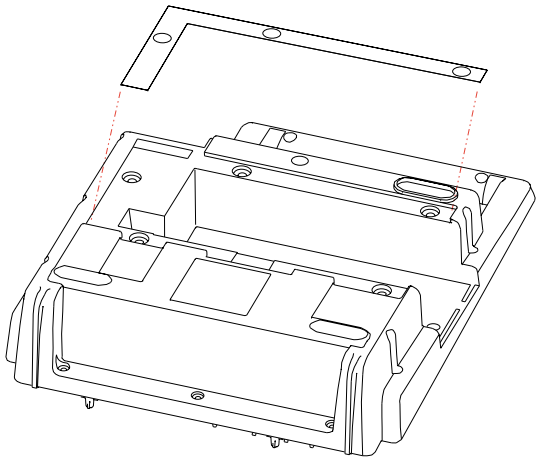
- **Discharging Energy Storage Capacitor**
- **Removing Main PCB—Monophasic AED** or **Removing Main PCB—Biphasic AED**

To replace the Battery Plate Wire Harness:

1. Remove and discard the five screws that attach the battery cavity plate to the underside of the lower enclosure. Remove the battery cavity plate.
2. Remove the double-stick tape and clean away any double-stick tape residue from the lower case and battery plate using isopropyl alcohol.
3. Identify the two connector pins in the battery cavity plate as shown on the next page.

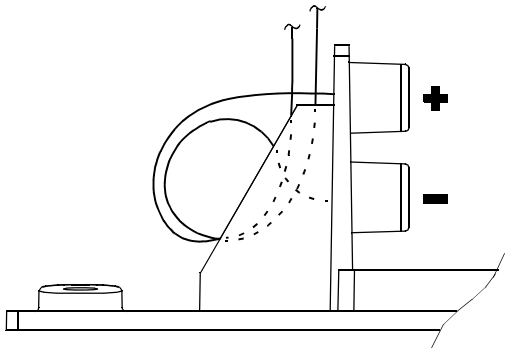
Replacing Battery Plate Wire Harness





4. To extract a battery pin, slide a section of metal tubing with a 1/4-inch nominal outside diameter and 7/32-inch nominal inside diameter over the battery pin you wish to remove. The metal tubing defeats the connector pin locks. Gently pull on the connector pin crimp barrel to remove the pin. Do not pull on the battery harness wires.
5. Repeat the process for the other battery pin.
6. Use a blunt tool to gently push the harness grommet through the hole in the lower enclosure.
7. Add the die-cut adhesive to seal the cavity as shown at the left.
8. Install a replacement battery plate wire harness and grommet into the lower enclosure. It may be necessary to use a blunt tool to gently push the grommet into place.
9. Insert the battery pins into their respective sockets in the battery cavity plate. Make sure you insert the red wire connector pin into the positive pin socket (indicated in the figure by a plus sign) and the black wire connector pin into the negative pin socket (indicated by a minus sign).

Replacing Battery Plate Wire Harness



10. Gently pull on the battery pin crimp barrel to verify that the connector pin is securely locked in place. Do not pull on the battery wire.
11. Twist a strain relief loop into each of the wires as shown at the left.
12. (LIFEPAK 500 Biphasic AED only): Check the pin polarity while the case is still open. Measure the resistance from the negative battery pin (the lower pin on the battery plate) to Pin 2 of the Molex connector that connects to the Main PCB (P12). Verify that the resistance is less than 2 Ω.
13. Reinstall the battery cavity plate onto the underside of the lower enclosure. Use five new screws to hold the battery cavity plate in place.

After reinstalling the battery cavity plate, jump to the **Installing Main PCB—Monophasic AED** or **Installing Main PCB—Biphasic AED** procedure and then to the **Reassembling Case** procedure.

Removing Energy Storage Capacitor—Monophasic AED

Application

Perform this procedure to remove the Energy Storage Capacitor on the LIFEPAK 500 Monophasic AED. For removing the Energy Storage Capacitor on the LIFEPAK 500 Biphasic AED, jump to the **Removing Energy Storage Capacitor—Biphasic AED** procedure.

Preparation

Before removing the Energy Storage Capacitor, you must first follow these procedures:

- **Removing Top Cover**

WARNING!

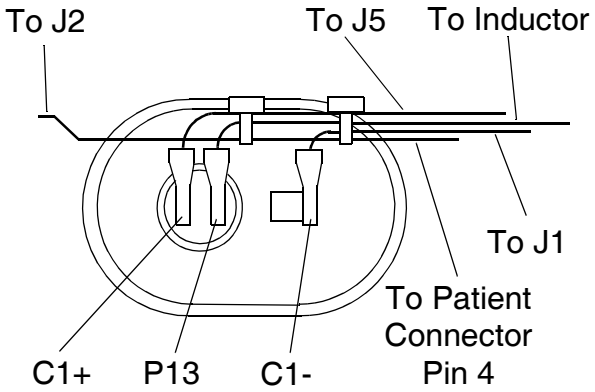
Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Removing Main PCB—Monophasic AED**

To remove the Energy Storage Capacitor:

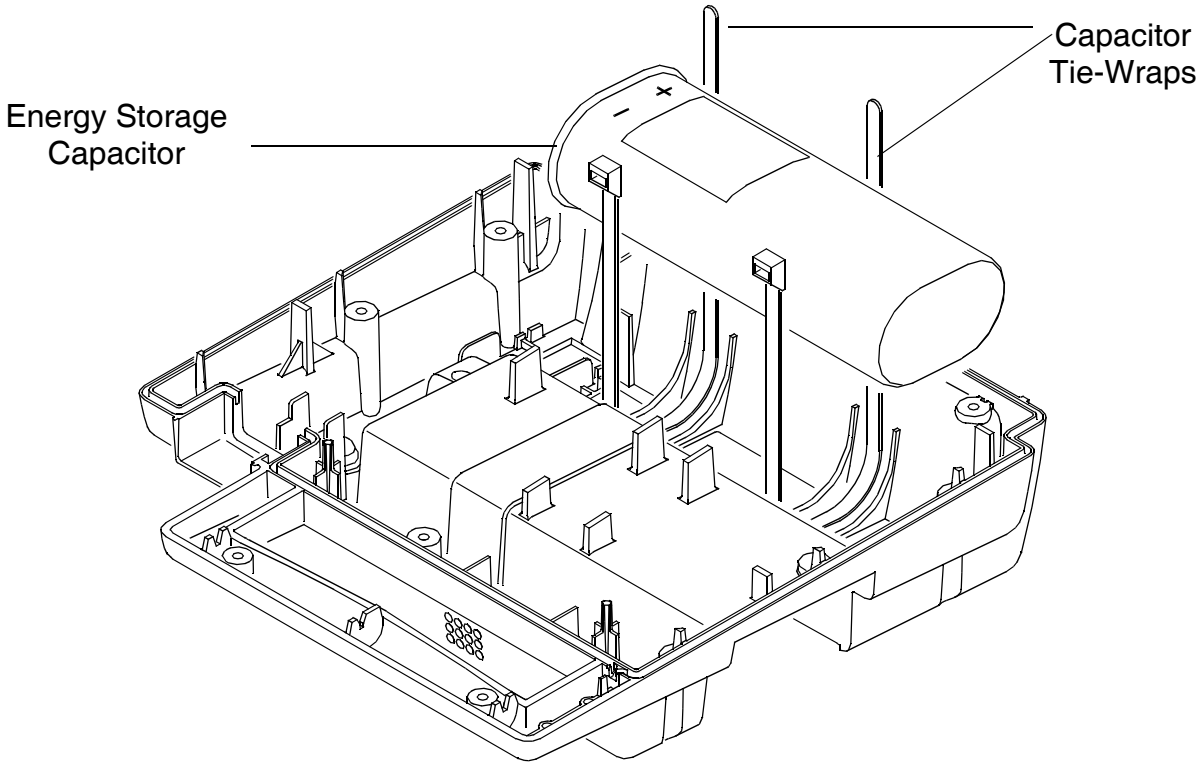
1. Cut and discard the two large capacitor tie-wraps.
2. Carefully lift the capacitor out of the capacitor cavity in the lower enclosure.
3. Disconnect the three capacitor spade-lugs. Set the capacitor aside.

Removing Energy Storage Capacitor—Monophasic AED



To install the Energy Storage Capacitor:

1. Reconnect the three capacitor spade-lugs to the replacement Energy Storage Capacitor, as shown at the left.
2. Install the new capacitor in the capacitor cavity of the lower enclosure.



Removing Energy Storage Capacitor—Monophasic AED

3. Install two new capacitor tie-wraps and tightly cinch the tie-wraps.

After installing the new Energy Storage Capacitor, return to the **Installing Main PCB—Monophasic AED** procedure and then to the **Reassembling Case** procedure.

Removing Energy Storage Capacitor—Biphasic AED

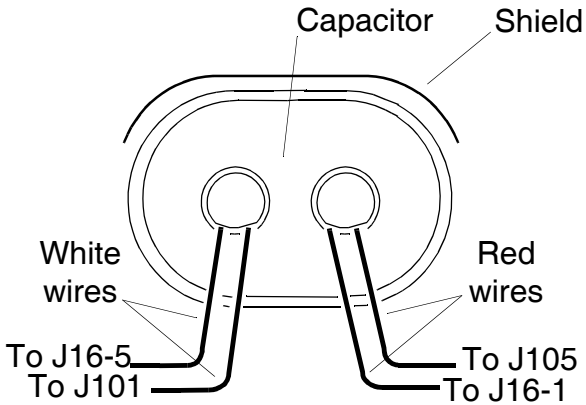
Application

This procedure is for removing the Energy Storage Capacitor on the LIFEPAK 500 Biphasic AED. For removing the Energy Storage Capacitor on the LIFEPAK 500 Monophasic AED, jump to the **Removing Energy Storage Capacitor—Monophasic AED** procedure.

Preparation

Before removing the Energy Storage Capacitor, you must first follow these procedures:

- **Removing Top Cover**



WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Removing Main PCB—Biphasic AED**

To remove the Energy Storage Capacitor:

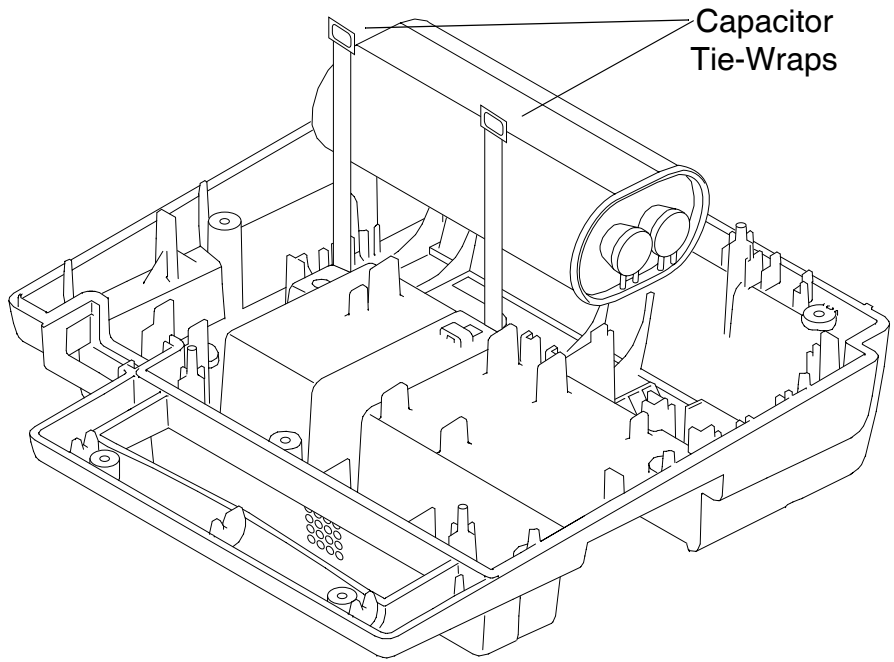
1. Cut and discard two large Capacitor Tie-Wraps.
2. Disconnect the four wires from the Biphasic PCB (J101 and J105) and the Main PCB (J16-1 and J16-5).
3. Carefully lift the capacitor out of the capacitor cavity in the lower enclosure.

Removing Energy Storage Capacitor—Biphasic AED

To install the new Energy Storage Capacitor:

1. Install the new capacitor in its cavity in the lower enclosure. Insure that the shield “tab” extends approximately 3/8 inch to the right end of the capacitor.
2. Install two new capacitor tie-wraps and tightly cinch the tie-wraps.

After installing the new Energy Storage Capacitor, return to the **Installing Main PCB—Biphasic AED** procedure and then to **Reassembling Case**.



Replacing Speaker Assembly

Preparation

Before replacing the Speaker Assembly, you must first follow these procedures:

- **Removing Top Cover**

WARNING!

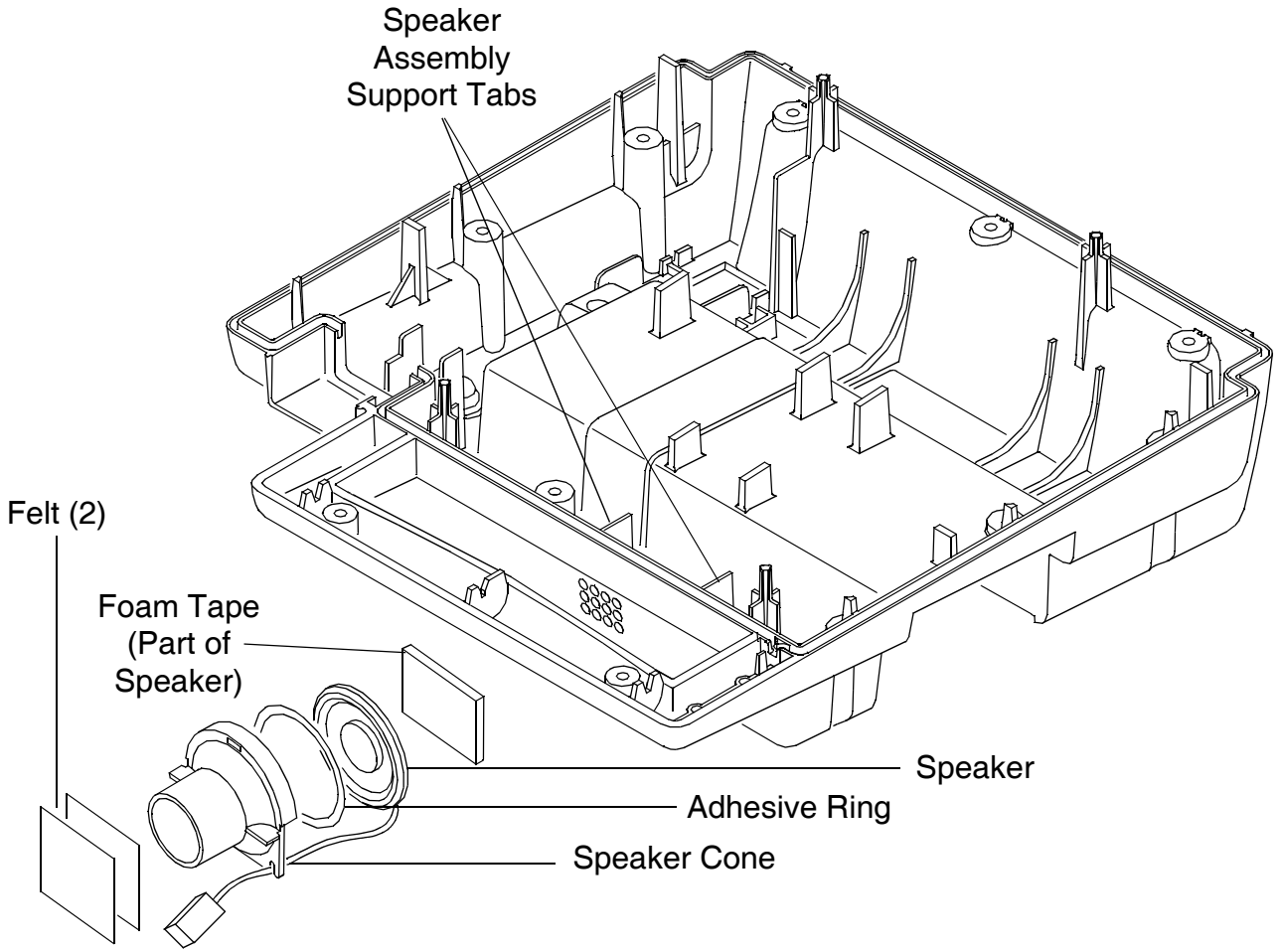
Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Setting Aside Main PCB**

Refer to the exploded view on the next page. To remove the Speaker Assembly:

1. Gently separate the tabs holding the Speaker Assembly and slide the assembly out of the lower enclosure.
2. Gently work the speaker loose from the speaker cone adhesive ring.
3. Carefully rotate the speaker and pull it away from the speaker cone.

Replacing Speaker Assembly



Replacing Speaker Assembly

Refer to the exploded view on the previous page.To install the new Speaker Assembly:

1. Carefully clean the adhesive ring mating surfaces of the speaker cone, the speaker assembly, and the inside of the case between the speaker assembly tabs with a clean, lint-free cloth, dampened with isopropyl alcohol. Allow the mating surfaces to dry thoroughly before going on to the next step.
2. Install the adhesive ring into the speaker cone.
3. Carefully rotate the replacement speaker and push it into the adhesive ring to form a seal.
4. Dress the replacement speaker wires through the speaker cone wire guide slot.
5. Check the speaker felts and, unless they are in good condition, slide two new speaker felts into the case behind the sound ports.
6. Gently separate the walls of the assembly housing and slide the replacement assembly into the lower enclosure. Make sure the flat side of the speaker cone aligns with the bottom of the lower enclosure.

After installing the new Speaker Assembly, jump to the **Reseating Main PCB** procedure and then to the **Reassembling Case** procedure.

Replacing Wave Shaping Inductor—Monophasic AED

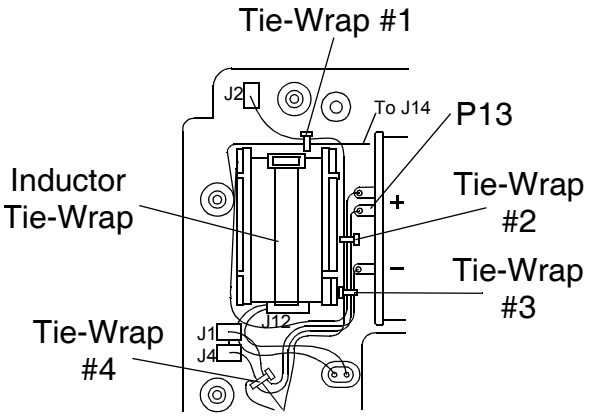
Application

The Wave Shaping Inductor is a component of the LIFEPAK 500 Monophasic AED only.

Preparation

Before replacing the Wave Shaping Inductor, you must first follow these procedures:

- **Removing Top Cover**



WARNING!

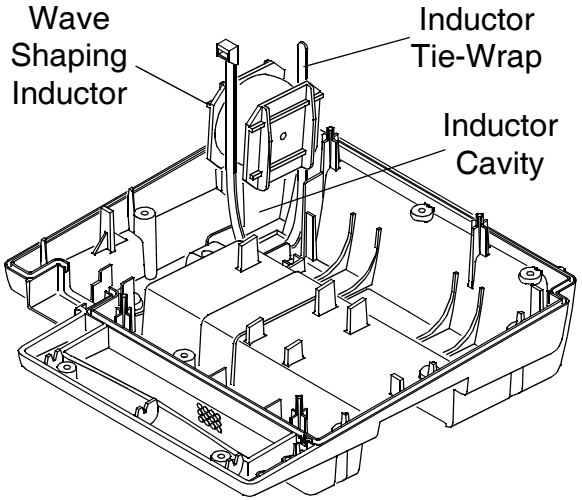
Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling.

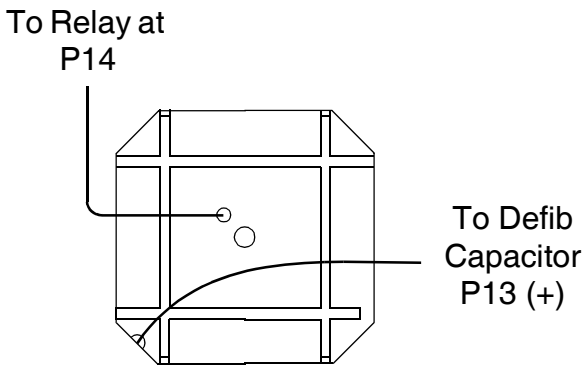
- **Discharging Energy Storage Capacitor**
- **Removing Main PCB—Monophasic AED**

To remove the Wave Shaping Inductor:

1. Remove the inductor tie-wrap.
2. Carefully cut tie-wraps #1, #2, and #3.
3. Carefully remove the inductor and disconnect P13 from the capacitor.

Replacing Wave Shaping Inductor—Monophasic AED



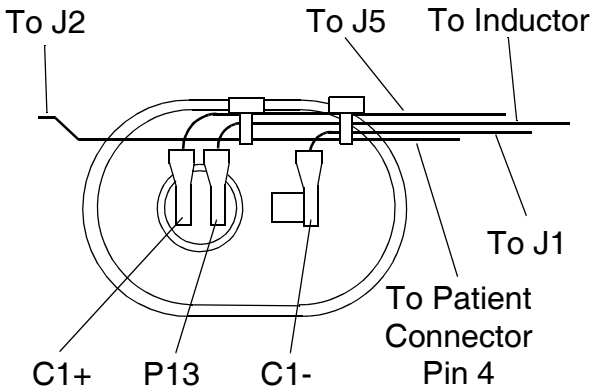


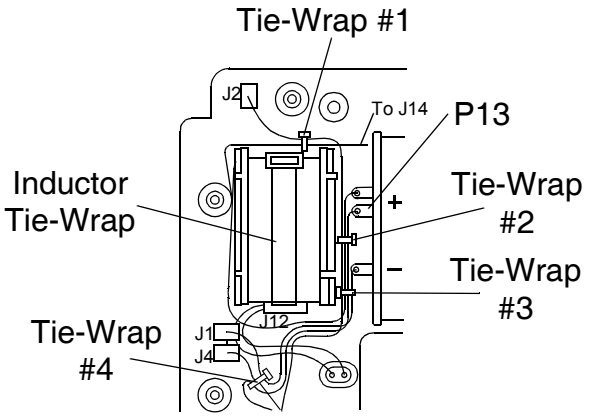
To install the new Wave Shaping Inductor:

1. Slide a new inductor tie-wrap through the attachment point in the inductor cavity as shown at left.
2. Connect the P13(+) spade-lug to the Energy Storage Capacitor according to the detail at left.
3. Slide the replacement inductor into the inductor cavity in the lower enclosure, with the inductor wires to the left, P14 towards the rear, and P13(+) towards the front. Continue with the steps for routing, dressing, and tie-wrapping the wiring on the next page.

Note: Be sure to position tie-wrap buckles as shown on the next page, tighten, and trim excess. The inductor tie-wrap must be pushed to the rear of the case. This allows for maximum clearance between the tie-wrap and the PCB when installed.

Replacing Wave Shaping Inductor—Monophasic AED





4. Route the wires over the capacitor terminals as shown at left.
5. Loosely install a new tie-wrap #3 as shown at the left.
6. Dress the wires as shown in the wire routing illustration at left. Tighten the tie-wraps. Clip and discard the tie-wrap ends.
7. Loosely install a new tie-wrap #1.

   Note: After completing the **Installing Main PCB—Monophasic AED** procedure, tighten tie-wrap #1. Clip and discard the tie-wrap end.
8. Installation is complete. Jump to the **Installing Main PCB—Monophasic AED** procedure and then to the **Reassembling Case** procedure.

Replacing Inductive Resistor—Biphasic AED

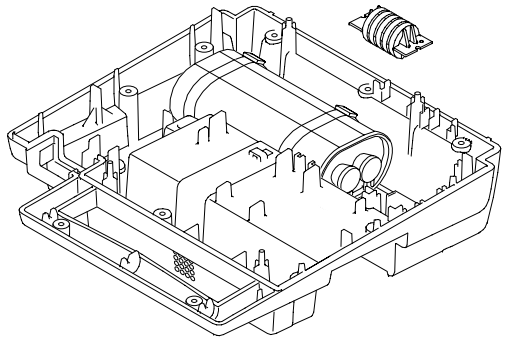
Application

The Inductive Resistor is a component of the LIFEPAK 500 Biphasic AED only.

Preparation

Before replacing the Inductive Resistor, you must first follow these procedures:

- **Removing Top Cover**



WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Removing Main PCB—Biphasic AED**
- **Replacing Biphasic PCB—Biphasic AED**

To replace the Inductive Resistor:

1. Carefully disconnect P102 and P108 from the Biphasic PCB, gently push the retaining tab, and slide the Inductive Resistor straight up out of its cavity.
2. Seat the new Inductive Resistor such that the wire exits toward the bottom side, and route the wire toward the rear of the case.
3. Connect spade-lug P102 to J102 and P108 to J108 on the Biphasic PCB.

Replacing Patient Connector Harness—Monophasic AED

Application

Perform this procedure to replace the Patient Connector Harness on the LIFEPAK 500 Monophasic AED. To replace the connector harness on the LIFEPAK 500 Biphasic AED, jump to the **Replacing Patient Connector Harness—Biphasic AED** procedure.

Preparation

Before replacing the Patient Connector Harness, you must first follow these procedures:

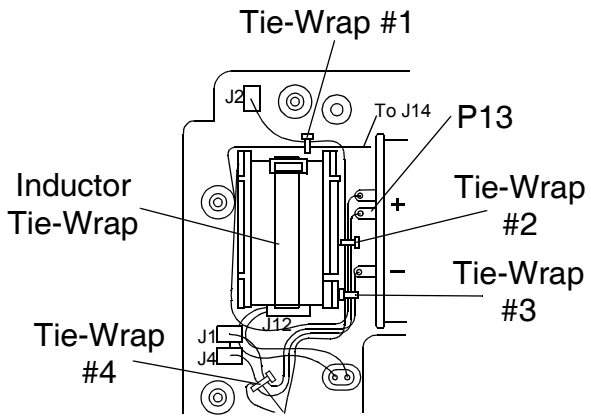
- **Removing Top Cover**

WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Removing Main PCB—Monophasic AED**

To remove the Patient Connector Harness:



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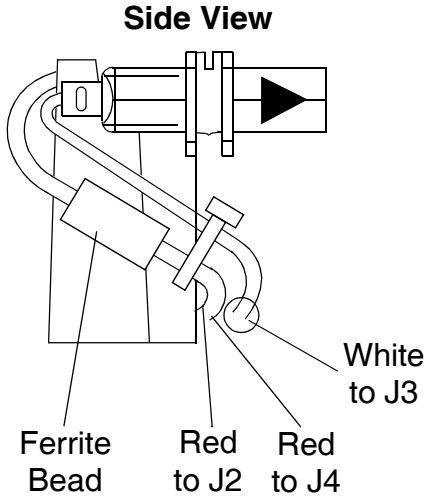
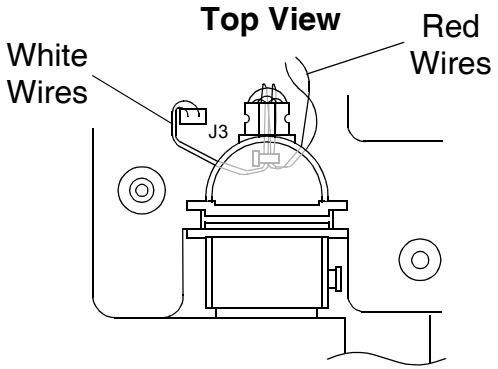
1. Carefully cut and remove tie-wraps #1, #2, #3, and #4.
2. Gently pull aside the perimeter seal over the top of the patient connector.
3. Lift the patient connector out of the lower enclosure.

Replacing Patient Connector Harness—Monophasic AED





To install the new Patient Connector Harness:

1. Bend the four patient connector wires 180 degrees under the patient connector body as shown at left.
2. Securely tie-wrap the four wires emerging from the patient connector body just below the ferrite bead.
3. Holding the wires under the connector body, slide patient connector into the lower enclosure. The white wires exit to the left, the red wires exit to the right. Refer to the diagram at the lower left.
4. Reinstall the perimeter seal along the top of the patient connector.
5. Complete the Patient Connector Harness installation as described on the next page.

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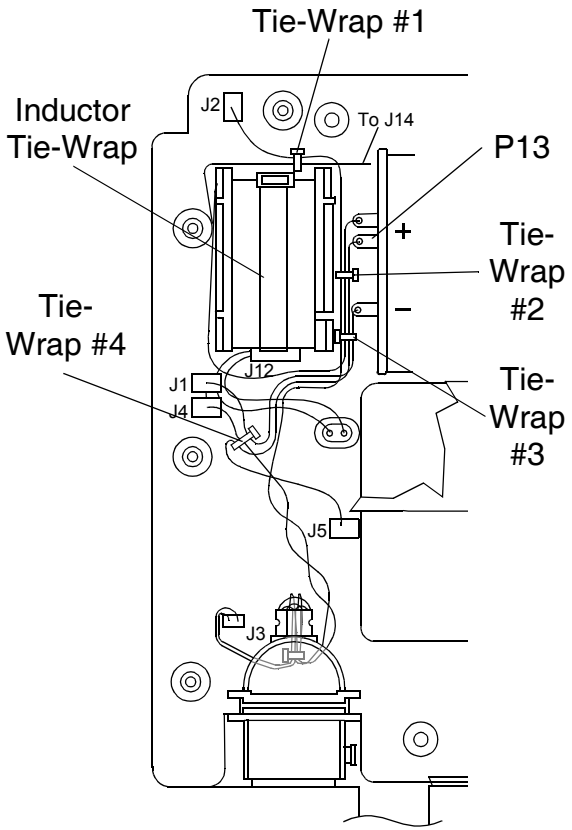
Replacing Patient Connector Harness—Monophasic AED



To route, dress, and tie-wrap wiring:

1. Position the Main PCB to the left of the lower enclosure, bottom surface facing up.

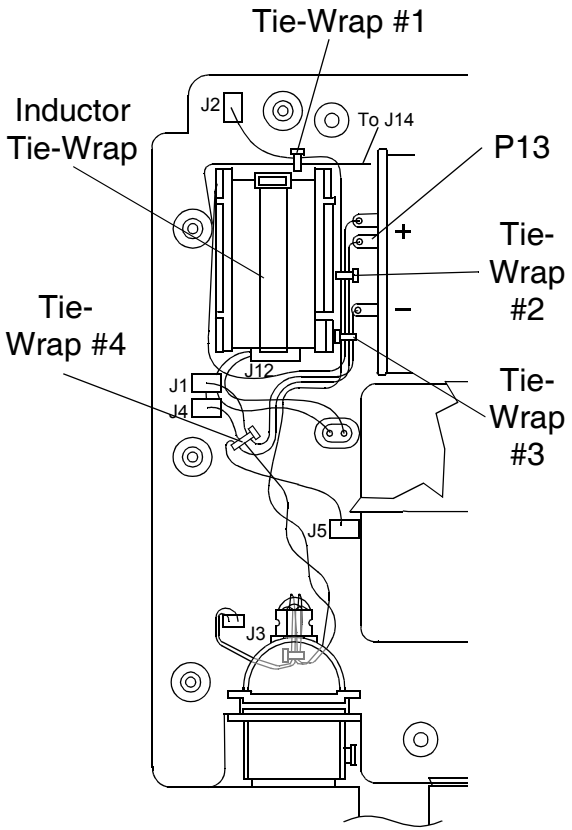
   Note: Refer to the **Wire Routing and Tie-Wrap Placement—Monophasic AED** illustrations in the Parts Lists and Assembly Diagrams section and the drawing at the left as you complete this procedure.

2. Connect:
   - P1 to J1
   - P4 to J4
3. Wrap the P2 wire two full turns clockwise around the P4 wire.
4. Route the P5(+) wire under P1 and P4 wires.
5. Connect P5(+) to J5.

Note: It is critical that the wire connected to J5 on the Main PCB is oriented so that it exits the PCB and routes directly down toward the lower case cavity. It is important that the wire does not loop back onto or near the PCB itself.

6. Loosely tie-wrap three wires: P5(+), P1, and P4 (Tie-Wrap #4).
7. Route the P2 wire over the capacitor terminals. Loosely tie-wrap four wires over the (–) terminal: P13(+), P5(+), P1(–), and P2 (Tie-Wrap #3).

Replacing Patient Connector Harness—Monophasic AED



8. Loosely tie-wrap three wires over the capacitor (+) terminals: P13(+), P5(+), and P2 (Tie-Wrap #2).
9. Dress the wires as shown in the **Wire Routing and Tie-Wrap Placement—Monophasic AED** illustrations found in the Parts Lists and Assembly Diagrams section. Tighten the tie-wraps. Clip and discard the ends.
10. Connect:
    - P2 to J2
    - P14 to J14
11. Tie-wrap the P14 and P2 wires behind the inductor (Tie-Wrap #1).
12. Connect:
    - P12 to J12
    - P3 to J3
    - P9 to J9

Patient Connect Harness installation is complete. Jump to the **Installing Main PCB—Monophasic AED** procedure and then to the **Reassembling Case** procedure.

Replacing Patient Connector Harness—Biphasic AED

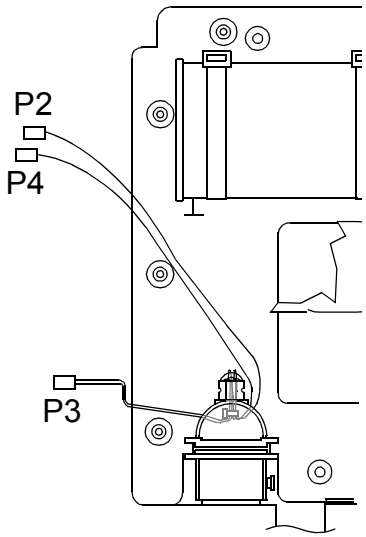
Application

Perform this procedure to replace the Patient Connector Harness on the LIFEPAK 500 Biphasic AED. To replace the connector harness on the LIFEPAK 500 Monophasic AED, jump to **Replacing Patient Connector Harness—Monophasic AED**.

Preparation

Before replacing the Patient Connector Harness, you must first follow these procedures:

- **Removing Top Cover**



WARNING!

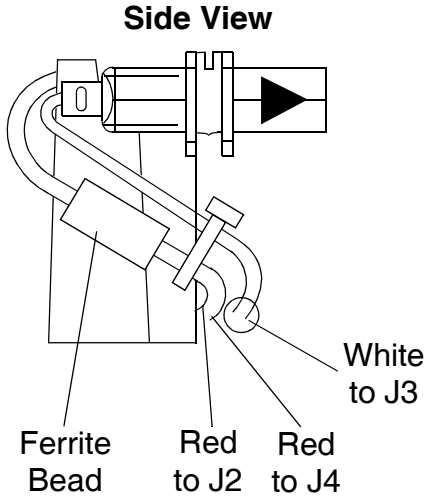
Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

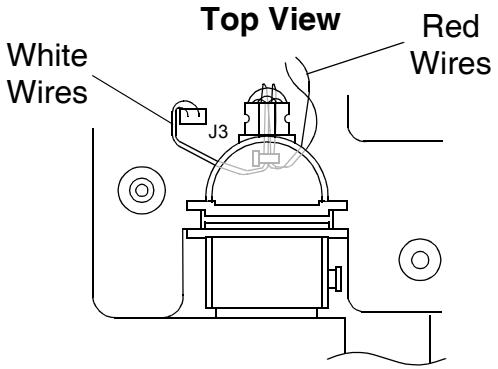
- **Discharging Energy Storage Capacitor**
- **Setting Aside Main PCB**

To remove the Patient Connector Harness:

1. Disconnect P3 of the serial cable from J3 of the Main PCB.
2. Disconnect the spade-lugs P2 and P4 from Main PCB J2 and J4. Do not pull on the wires.
3. Gently pull aside the perimeter seal over the top of the patient connector, and lift the patient connector out of the lower enclosure.

Replacing Patient Connector Harness—Biphasic AED





To install the new Patient Connector Harness:

1. Bend the four patient connector wires 180 degrees under the patient connector body as shown at left.
2. Securely tie-wrap the four wires emerging from the patient connector body just below the ferrite bead.
3. Holding the wires under the connector body, slide patient connector into the lower enclosure. The white wires exit to the left, the red wires exit to the right. Refer to the diagram at the lower left.
4. Reinstall the perimeter seal along the top of the patient connector.
5. Connect the spade-lugs P2 and P4 to Main PCB J2 and J4.
6. Connect P3 of the serial cable to J3 of the Main PCB.

Patient Connect Harness installation is complete. Jump to the **Reseating Main PCB** procedure and then to the **Reassembling Case** procedure.

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Replacing Lower Enclosure Perimeter Seal

Preparation

Before replacing the Lower Enclosure Perimeter Seal, you must first follow these procedures:

- **Removing Top Cover**

WARNING!

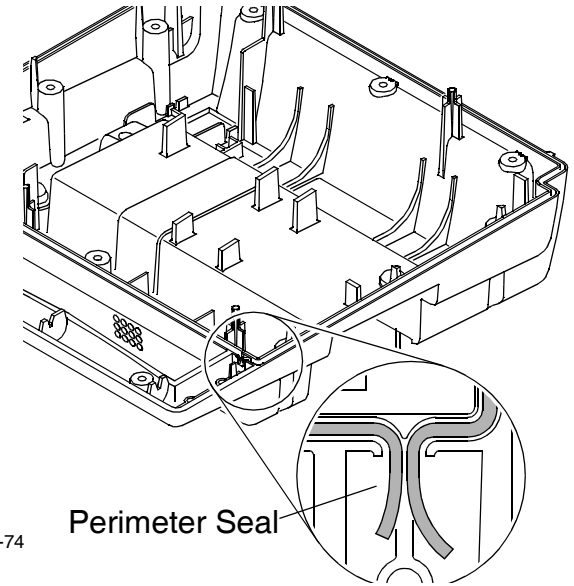
Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**

To remove the Lower Enclosure Perimeter Seal:

1. Grasp one end of the perimeter seal and gently pull the seal away from the groove along the edge of the lower enclosure.
2. Install the replacement perimeter seal by gently pushing the seal into the groove along the edge of the lower enclosure. Be careful to avoid stretching the perimeter seal.
3. Align the ends of the perimeter seal as shown in the detail on the left.

After you have installed the new perimeter seal, jump to the **Reassembling Case** procedure.



11-74

Replacing Lower Case Corner and Patient Connector Door

Preparation

Before replacing the Lower Case Corner and Patient Connector Door, you must first follow these procedures:

- **Removing Top Cover**

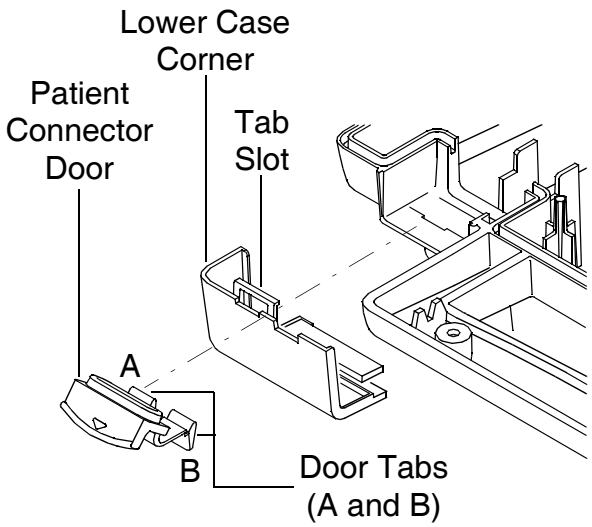
WARNING!

Shock hazard. The Energy Storage Capacitor carries high voltage. Remove the battery and discharge the capacitor before handling. See:

- **Discharging Energy Storage Capacitor**
- **Removing Main PCB—Monophasic AED** or **Removing Main PCB—Biphasic AED**

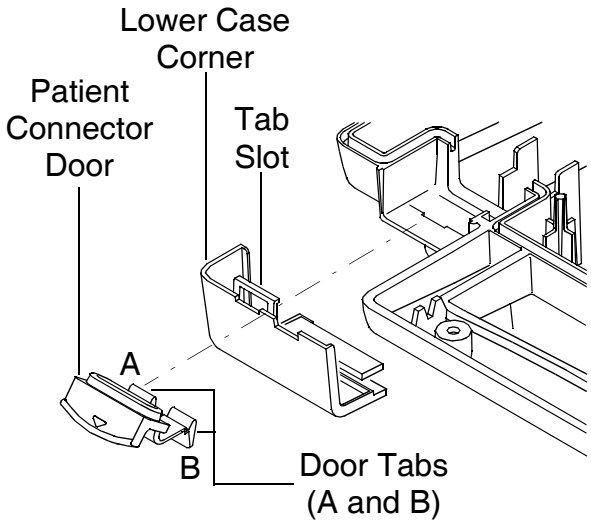
To remove the Lower Case Corner and Patient Connector Door:

1. Remove the five screws securing the Battery Cavity Plate. Allow the Battery Cavity Plate to hang loosely on the battery wires. (Do not disconnect the battery wires.)
2. Lift the perimeter seal and patient connector to one side.
3. Disengage the Tab Slot from the Lower Case Locking Tab.
4. Slide the Lower Case Corner and Patient Connector Door down and out of the lower case.



11-75

Replacing Lower Case Corner and Patient Connector Door



To install the Lower Case Corner and Patient Connector Door:

1. Align the Patient Connector Door and Lower Case Corner as shown at the left.
2. Insert Door Tab A through the Tab Slot. Insert Door Tab B into the notch adjoining the Tab Slot.
3. Slide the Lower Case Corner into the Lower Case Guide Slots.
4. Lock the Tab Slot over the Lower Case Locking Tab to secure the Lower Case Corner in place.
5. Inspect the installation to verify proper alignment of door, case corner, and lower case.
6. Reinstall the Battery Cavity Plate.
7. Reinstall the patient connector and perimeter seal.

After installing the new perimeter seal, jump to the **Installing Main PCB—Monophasic AED** or **Installing Main PCB—Biphasic AED** procedure and then to the **Reassembling Case** procedure.

Operating System Software

LIFEPAK 500 AED Operating System software may only be loaded by authorized Medtronic Physio-Control personnel. The LIFEPAK 500 AED Operating System is pre-loaded into Replacement Main PCB assemblies prior to shipment from the factory.

Contact your local Medtronic Physio-Control representative if you need assistance concerning different versions of the LIFEPAK 500 AED Operating System software.

Parts Lists and Assembly Diagrams

The Parts List and Assembly Diagrams section is a hierarchical reference for use in identifying components needed to repair the LIFEPAK 500 AED. With the introduction of the LIFEPAK 500 Biphasic AED, the part number scheme for differentiating AED versions changes.

Product Configuration

The **Parts Configurator**, which leads you to the replaceable parts that are specific to your unit, controls LIFEPAK 500 AED final assemblies. Top level part numbers (identified by six digits after the part number) indicate units controlled under the Parts Configurator.

The **Product Line History** section lists the top-level part numbers of earlier-version monophasic AEDs. These units are identified by three digits after the part number.

Selecting a **Service Kit** part number jumps to a listing of all components included in the kit.

Monophasic and Biphasic Assembly Parts are components used in all versions of the AED. Use this table to locate components included in service kits and other components that may not be part of a kit. Clicking on the component part number jumps to a typical drawing view showing the part installed in an AED final assembly.

Note: Final Assembly Parts are shown in a typical context but may appear slightly different in your AED, depending on the configuration and options.

Parts Lists and Assembly Diagrams

Final Assembly Parts Lists catalog the parts that are specific to a version of the LIFEPAK 500 AED.

Replacement Kits list the parts supplied for service repair purposes.

Common Accessories table lists part numbers for separate accessories for use with the LIFEPAK 500 AED.

Assembly Diagrams show components of the LIFEPAK 500 AED as they are installed in an AED final assembly. Each Assembly Diagram depicts a different view of the AED. Numbered callouts identify the individual AED components. Clicking on a number associated with a callout triggers one of two actions:

- Selecting a callout for a component that is common to all versions of the AED jumps to a parts list where the desired component part number can be identified.
- Selecting a callout for a component that is unique to a specific version of the AED (e.g., language specific labels) jumps to the Final Assembly Parts listing where the desired component part number can be identified.

Parts Configurator

Waveform Type?

Which defibrillation waveform does your unit use?	
Monophasic	**Biphasic**

Parts Configurator

Analyze-Button unit?

Which defibrillation waveform does your unit use?	
Monophasic	

Does your unit have a third button (Analyze)?	
3-Button	**2-Button**

Start Over

Parts Configurator

Analyze-Button unit?

Which defibrillation waveform does your unit use?	
	Biphasic

Does your unit have a third button (Analyze)?	
3-Button	2-Button

Start Over

Parts Lists

Service Kits

Item	Quantity	Part Number	Part Description	Note
	1	3010399-000	Kit – Replacement, Case	Used on monophasic units[1]
	1	3010399-001	Kit – Replacement, Battery Plate	Used on all units
	1	3010399-002	Kit – Replacement, U.S. Domestic Labels, 3-Button Unit	Used on monophasic units
	1	3010399-003	Kit – Replacement, Capacitor	Used on monophasic units
	1	3010399-004	Kit – Replacement, Inductor	Used on monophasic units
	1	3010399-005	Kit – Replacement, Main PCB Installation Components	Used on all units
	1	3010399-006	Kit – Replacement, QUIK-COMBO Connector	Used on monophasic units
	1	3010399-007	Kit – Replacement, Capacitor Wires	Used on monophasic units
	1	3010399-013	Kit – Replacement, Main PCB, English	Used on monophasic units
W01	1	3010399-014	Kit – Replacement, Speaker	Used on all units
	1	3010399-015	Kit – Replacement, Case, Without Readiness Display	Used on biphasic units[1]

1. Order product labels separately. Refer to the appropriate Final Assembly Parts List for the AED under repair.
Label Replacement Kit for U.S. Domestic Units only.

Parts Lists

Service Kits

Item	Quantity	Part Number	Part Description	Note
	1	3010399-016	Kit – Replacement, U.S. Domestic Labels, 3-Button Unit	Used on biphasic units
A02	1	3010399-017	Kit – Replacement, Capacitor	Used on biphasic units
W03	1	3010399-018	Kit – Replacement, Inductive Resistor	Used on biphasic units
	1	3010399-019	Kit – Replacement, LIFEPAK 500 Wires	Used on biphasic units
A01	1	3010399-020	Kit – Replacement, Main PCB, English	Used on biphasic units
W04	1	3010399-021	Kit – Replacement, QUIK-COMBO Connector	Used on biphasic units
A03	1	3010399-022	Kit – Replacement, PCB Assembly, Biphasic PCB	Used on biphasic units
	1	3010399-023	Kit – Replacement, U.S. Domestic Labels, 2-Button Unit	Used on biphasic units
	1	3010399-024	Kit – Replacement, U.S. Domestic Labels, 2-Button Unit	Used on monophasic units
	1	3010399-025	Kit – Replacement, Case, Readiness Display Units	Used on biphasic units
	1	3010399-026	Kit – Replacement, Readiness Display	Used on biphasic units

Parts Lists

Case Replacement Kit, Monophasic, PN 3010399-000

Item	Quantity	Part Number	Part Description
3	1	3007973-001	LCD Shield
4	1	3005342-002	Upper Enclosure
7	4	802885-01	Mounting Foot
8	1	3005341-001	Lower Enclosure
9	17	202253-570	#6-32 × .375L PH Screw
14	1	3005346-000	Lower Case Corner
15	1	3005358-000	Patient Connector Door
17	2	3007670-000	Speaker Felt
19	1	3005356-002	Battery Plate Cavity
20	1	804234-02	Perimeter Seal
21	5	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L
22	3	200536-011	Nylon Cable Tie Retainer, .35W × 20.90L
Ref	1	3009065-00	Label — Physio-Control Icon
Ref	1	3009415-000	Adhesive, Battery Plate

Parts Lists

Battery Plate Replacement Kit PN 3010399-001

Item	Quantity	Part Number	Part Description
W02	1	3005361-002	Battery Plate Wire Harness
9	5	202253-570	#6-32 × .375L PH Screw
19	1	3005356-003	Battery Plate Cavity
Ref	1	3009415-000	Adhesive, Battery Plate

Note: Order the Warning/Danger Label appropriate for the AED under repair separately.

Parts Lists

U.S. Domestic Labels Replacement Kit, Monophasic, 3-Button Unit, PN 3010399-002

Item	Quantity	Part Number	Part Description
2	1	3005347-000	Keypanel Label, 3-Button Unit
1	1	3005350-008	Warning/Danger Label
5	1	3005349-000	Shock/Hazard Label
6	1	3005348-002	Serial Number Label

Parts Lists

Capacitor Replacement Kit, Monophasic, PN 3010399-003

Item	Quantity	Part Number	Part Description
A02	1	3008533-000	Energy Storage Capacitor
9	12	202253-570	#6-32 × .375L PH Screw
21	5	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L
22	2	200536-011	Self-Locking Nylon Cable Tie Retainer, .35W × 20.90L

Parts Lists

Inductor Replacement Kit, Monophasic, PN 3010399-004

Item	Quantity	Part Number	Part Description
W03	1	3005361-005	Inductor / Wire Harness
9	12	202253-570	#6-32 × .375L PH Screw
21	5	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L
22	1	200536-011	Nylon Cable Tie Retainer, .35W × 20.90L

Parts Lists

Installation Components Replacement Kit, Main PCB, PN 3010399-005

Item	Quantity	Part Number	Part Description
10	1	3005357-002	High Voltage Shield
11	2	200363-031	PCB Rivet Fastener
12	5	3005344-000	Alps Switch Cap
13	4	3007957-001	Vibration Dampening Grommet

Parts Lists

QUIK-COMBO Connector Replacement Kit, Monophasic, PN 3010399-006

Item	Quantity	Part Number	Part Description
W04	1	3006144-000	Patient/Interface Cable Assembly
9	12	202253-570	#6-32 × .375L PH Screw
21	5	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L

Parts Lists

Capacitor Wires Replacement Kit, Monophasic, PN 3010399-007

Item	Quantity	Part Number	Part Description
W05	1	3011622-001	Capacitor Wire Harness #1
W06	1	3011622-002	Capacitor Wire Harness #2
9	12	202253-570	#6-32 × .375L PH Screw
21	5	200536-008	Self-Locking Nylon Retainer Cable Tie, .10W × 5.50L

Parts Lists

Main PCB Replacement Kit, Monophasic, PN 3010399-013

Item	Quantity	Part Number	Part Description
A01	1	**3005355-008**	Main PCB Assembly
9	12	**202253-570**	#6-32 × .375L PH Screw
Ref	1*	3005360-XXX	Operating System Software
Ref	1	3010399-005	Kit – Replacement, Main PCB Installation Components

* Installation by Physio representative only.

Parts Lists

Speaker Replacement Kit, PN 3010399-014

Item	Quantity	Part Number	Part Description
W01	1	3011622-000	Speaker / Main PCB Wire Harness
9	12	202253-570	#6-32 × .375L PH Screw
18	1	804966-01	Speaker Adhesive
16	1	3005393-000	Cone

Parts Lists

Case Replacement Kit, Biphasic without Readiness Display, PN 3010399-015

Item	Quantity	Part Number	Part Description
3	1	3007973-001	LCD Shield
4	1	3005342-002	Upper Enclosure
7	4	802885-01	Mounting Foot
8	1	3011362-001	Lower Enclosure
9	17	202253-570	#6-32 × .375L PH Screw
14	1	3005346-000	Lower Case Corner
15	1	3005358-000	Patient Connector Door
17	2	3007670-000	Speaker Felt
19	1	3005356-003	Battery Plate Cavity
20	1	804234-02	Perimeter Seal
21	7	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L
22	2	200536-011	Self-Locking Nylon Cable Tie Retainer, .35W × 21.0L
Ref	1	3009065-00	Label — Physio-Control Icon
Ref	1	3009415-000	Adhesive, Battery Plate
Ref	1	804447-21	Spacer-Foam, Speaker

Parts Lists

U.S. Domestic Labels Replacement Kit, Biphasic, 3-Button Unit, PN 3010399-016

Item	Quantity	Part Number	Part Description
2	1	3011794-014	Keypanel Label, 3-Button Unit
1	1	3005350-008	Warning/Danger Label
5	1	3005349-000	Shock/Hazard Label
6	1	3005348-002	Serial Number Label
Ref	1	3009065-00	Label - Physio-Control Icon

Parts Lists

Capacitor Replacement Kit, Biphasic, PN 3010399-017

Item	Quantity	Part Number	Part Description
A02	1	3008164-000	High Energy Storage Capacitor
9	12	202253-570	#6-32 × .375L PH Screw
21	7	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L
22	2	200536-011	Self-Locking Nylon Cable Tie Retainer, .35W × 21L
Ref	1	3009787-02	Shield, Capacitor

Parts Lists

Inductive Resistor Replacement Kit, Biphasic, PN 3010399-018

Item	Quantity	Part Number	Part Description
W03	1	3010212-02	Inductive Resistor, 5 Ohm
9	12	202253-570	#6-32 × .375L PH Screw
21	1	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L

Parts Lists

Wires Replacement Kit, Biphasic, PN 3010399-019

Item	Quantity	Part Number	Part Description
W05	1	**3011793-006**	Wire Harness - P15 to P104
W07	1	**3011793-004**	Wire Harness - P13 to P107
W06	1	**3011793-005**	Wire Harness - P19 to P103
9	12	**202253-570**	#6-32 × .375L PH Screw
21	7	**200536-008**	Self-Locking Nylon Retainer Cable Tie, .10W × 5.50L
Ref	1	3011792-000	Cable - Flex

Parts Lists

Main PCB Replacement Kit, Biphasic, PN 3010399-020

Item	Quantity	Part Number	Part Description
A01	1	**3011735-005**	Main PCB Assembly
9	12	**202253-570**	#6-32 × .375L PH Screw
21	7	**200536-008**	Self-Locking Nylon Retainer Cable Tie, .10W × 5.50L
Ref	1*	3011965-XXX	Operating System Software
Ref	1	3010399-005	Kit - Repair, Main PCB Installation Components
10	1	**3011791-000**	Shield - PCB

* Installation by Physio representative only.

Parts Lists

QUIK-COMBO Connector Replacement Kit, Biphasic, PN 3010399-021

Item	Quantity	Part Number	Part Description
W04	1	3006144-002	Patient/Interface Cable Assembly
9	12	202253-570	#6-32 × .375L PH Screw
21	2	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L

Parts Lists

Biphasic PCB Replacement Kit, PN 3010399-022

Item	Quantity	Part Number	Part Description
A03	1	3010178-06	PCB Assembly, Biphasic PCB
9	12	202253-570	#6-32 × .375L PH Screw

Parts Lists

U.S. Domestic Labels Replacement Kit, Biphasic, 2-Button Unit, PN 3010399-023

Item	Quantity	Part Number	Part Description
2	1	3011794-015	Keypanel Label, 2-Button Unit
1	1	3005350-008	Warning/Danger Label
5	1	3005349-000	Shock/Hazard Label
6	1	3005348-002	Serial Number Label

Parts Lists

U.S. Domestic Labels Replacement Kit, Monophasic, 2-Button Unit, PN 3010399-024

Item	Quantity	Part Number	Part Description
2	1	3005347-007	Keypanel Label, 2-Button Unit
1	1	3005350-008	Warning/Danger Label
5	1	3005349-000	Shock/Hazard Label
6	1	3005348-002	Serial Number Label

Parts Lists

Case Replacement Kit, for Biphasic Unit with Readiness Display, PN 3010399-025

Item	Quantity	Part Number	Part Description
3	1	3007973-001	LCD Shield
4	1	3005342-003	Upper Enclosure
7	4	802885-01	Mounting Foot
8	1	3011362-002	Lower Enclosure
9	12	202253-570	#6-32 × .375L PH Screw
14	1	3005346-000	Lower Case Corner
15	1	3005358-000	Patient Connector Door
17	2	3007670-000	Speaker Felt
19	1	3005356-003	Battery Plate Cavity
20	1	804234-02	Perimeter Seal
21	7	200536-008	Self-Locking Nylon Cable Tie Retainer, .10W × 5.50L
22	2	200536-011	Self-Locking Nylon Cable Tie Retainer, .35W × 21.0L

Parts Lists

Case Replacement Kit, for Biphasic Unit with Readiness Display, PN 3010399-025—continued

Item	Quantity	Part Number	Part Description
	1	3012774-001	Grommet, Readiness Display
Ref	1	3009065-00	Label — Physio-Control Icon
Ref	1	3009415-000	Adhesive, Battery Plate
Ref	1	804447-21	Spacer-Foam

Parts Lists

Readiness Display Replacement Kit, PN 3010399-026

Item	Quantity	Part Number	Part Description
	1	3012775-001	Readiness Display Assembly
	1	3012774-001	Grommet, Readiness Display
9	12	202253-570	#6-32 × .375L PH Screw

Parts Lists

LIFEPAK 500 Monophasic and Biphasic AED Miscellaneous Replacement Items

Item	Quantity	Part Number	Part Description	References
11	2	200363-031	Rivet - Push, .1 × .177L	
9	17	202253-570	#6-32 × .375L PH Screw	
12	5	3005344-000	Alps Cap Switch	
15	1	3005358-000	Patient Connector Door	
W02	1	3005361-002	Battery Plate Wire Harness	
21	5	200536-008	Self-Locking Nylon Cable Tie Retainer	
23	1	3009897-000	Shield - Wire Harness	
7	4	802885-01	Mounting Foot	
20	1	804234-02	Perimeter Seal	
Ref	1	202305-000	Clock Battery, Lithium	

Parts Lists

LIFEPAK 500 Monophasic AED Final Assembly, 3-Button Unit

Item	Quantity	Part Number	Part Description	References
	1	3005400-COM	LIFEPAK 500 Monophasic Final Assembly	
5	1	**3005349-000**	Shock/Hazard Label, U.S. Domestic	**Select international label**
1	1	**3005350-008**	Warning/Danger Label, North American English	**Select other language**
2	1	**3005347-000**	Keypad Label, North American English, 3-Button Unit	**Select other language**
Ref	1	3005360-XXX	Operating System Software	Installation by Physio representative only

Parts Lists

LIFEPAK 500 Monophasic AED Final Assembly, 2-Button Unit

Item	Quantity	Part Number	Part Description	References
	1	3005400-COM	LIFEPAK 500 Monophasic Final Assembly	
5	1	**3005349-000**	Shock/Hazard Label, U.S. Domestic	**Select international label**
1	1	**3005350-008**	Warning/Danger Label, North American English	**Select other language**
2	1	**3005347-007**	Keypad Label, North American English, 2-Button	**Select other language**
Ref	1	3005360-XXX	Operating System Software	Installation by Physio representative only

Parts Lists

LIFEPAK 500 Biphasic AED Final Assembly, 3-Button Unit

Item	Quantity	Part Number	Part Description	References
	1	3011790-COM	LIFEPAK 500 Biphasic Final Assembly	
5	1	**3005349-000**	Shock/Hazard Label, U.S. Domestic	**Select international label**
1	1	**3005350-008**	Warning/Danger Label, North American English	**Select other language**
2	1	**3011794-014**	Keypad Label, North American English, 3-Button Unit	**Select other language**
Ref	1	3011965-XXX	Operating System Software	Installation by Physio representative only

Parts Lists

LIFEPAK 500 Biphasic AED Final Assembly, 2-Button Unit

Item	Quantity	Part Number	Part Description	References
	1	3011790-COM	LIFEPAK 500 Biphasic Final Assembly	
5	1	**3005349-000**	Shock/Hazard Label, U.S. Domestic	**Select international label**
1	1	**3005350-008**	Warning/Danger Label, North American English	**Select other language**
2	1	**3011794-015**	Keypad Label, North American English, 2-Button Unit	**Select other language**
Ref	1	3011965-XXX	Operating System Software	Installation by Physio representative only

Parts Lists

Keypad Label Language, Monophasic, 3-Button Unit

Item	Quantity	Part Number	Part Description	References
2	1	3005347-000	Keypad Label, English, 3-Button Unit	
2	1	3005347-001	Keypad Label, French, 3-Button Unit	
2	1	3005347-002	Keypad Label, German, 3-Button Unit	
2	1	3005347-003	Keypad Label, Italian, 3-Button Unit	
2	1	3005347-004	Keypad Label, Spanish, 3-Button Unit	
2	1	3005347-005	Keypad Label, Swedish, 3-Button Unit	
2	1	3005347-006	Keypad Label, Japanese, 3-Button Unit	
2	1	3005347-014	Keypad Label, Danish, 3-Button Unit	
2	1	3005347-016	Keypad Label, Dutch, 3-Button Unit	
2	1	3005347-018	Keypad Label, Polish, 3-Button Unit	
2	1	3005347-020	Keypad Label, Brazilian Portuguese, 3-Button Unit	

Parts Lists

Keypad Label Language, Monophasic, 3-Button Unit—continued

Item	Quantity	Part Number	Part Description	References
2	1	3005347-022	Keypad Label, Finnish, 3-Button Unit	
2	1	3005347-024	Keypad Label, Iberian Portuguese, 3-Button Unit	
2	1	3005347-026	Keypad Label, Hungarian, 3-Button Unit	

Parts Lists

Keypad Label Language, Monophasic, 2-Button Unit

Item	Quantity	Part Number	Part Description	References
2	1	3005347-007	Keypad Label, English, 2-Button Unit	
2	1	3005347-008	Keypad Label, French, 2-Button Unit	
2	1	3005347-009	Keypad Label, German, 2-Button Unit	
2	1	3005347-010	Keypad Label, Italian, 2-Button Unit	
2	1	3005347-011	Keypad Label, Spanish, 2-Button Unit	
2	1	3005347-012	Keypad Label, Swedish, 2-Button Unit	
2	1	3005347-013	Keypad Label, Japanese, 2-Button Unit	
2	1	3005347-015	Keypad Label, Danish, 2-Button Unit	
2	1	3005347-017	Keypad Label, Dutch, 2-Button Unit	
2	1	3005347-019	Keypad Label, Polish, 2-Button Unit	
2	1	3005347-021	Keypad Label, Brazilian Portuguese, 2-Button Unit	

Parts Lists

Keypad Label Language, Monophasic, 2-Button Unit—continued

Item	Quantity	Part Number	Part Description	References
2	1	3005347-023	Keypad Label, Finnish, 2-Button Unit	
2	1	3005347-025	Keypad Label, Iberian Portuguese, 2-Button Unit	
2	1	3005347-027	Keypad Label, Hungarian, 2-Button Unit	

Parts Lists

Keypad Label Language, Biphasic, 3-Button Unit

Item	Quantity	Part Number	Part Description	References
2	1	3011794-001	Keypad Label, French, 3-Button Unit	
2	1	3011794-002	Keypad Label, German, 3-Button Unit	
2	1	3011794-003	Keypad Label, Italian, 3-Button Unit	
2	1	3011794-004	Keypad Label, Spanish, 3-Button Unit	
2	1	3011794-005	Keypad Label, Swedish, 3-Button Unit	
2	1	3011794-006	Keypad Label, Japanese, 3-Button Unit	
2	1	3011794-014	Keypad Label, English, 3-Button Unit	
2	1	3011794-016	Keypad Label, Danish, 3-Button Unit	
2	1	3011794-018	Keypad Label, Dutch, 3-Button Unit	
2	1	3011794-026	Keypad Label, Iberian Portuguese, 3-Button Unit	
2	1	3011794-028	Keypad Label, Hungarian, 3-Button Unit	

Parts Lists

Keypad Label Language, Biphasic, 3-Button Unit—continued

Item	Quantity	Part Number	Part Description	References
2	1	3011794-049	Keypad Label, Polish, 3-Button Unit	
2	1	3011794-052	Keypad Label, Brazilian Portuguese, 3-Button Unit	
2	1	3011794-053	Keypad Label, Finnish, 3-Button Unit	

Parts Lists

Keypad Label Language, Biphasic, 2-Button Unit

Item	Quantity	Part Number	Part Description	References
2	1	3011794-008	Keypad Label, French, 2-Button Unit	
2	1	3011794-009	Keypad Label, German, 2-Button Unit	
2	1	3011794-010	Keypad Label, Italian, 2-Button Unit	
2	1	3011794-011	Keypad Label, Spanish, 2-Button Unit	
2	1	3011794-012	Keypad Label, Swedish, 2-Button Unit	
2	1	3011794-013	Keypad Label, Japanese, 2-Button Unit	
2	1	3011794-015	Keypad Label, English, 2-Button Unit	
2	1	3011794-017	Keypad Label, Danish, 2-Button Unit	
2	1	3011794-019	Keypad Label, Dutch, 2-Button Unit	
2	1	3011794-027	Keypad Label, Iberian Portuguese, 2-Button Unit	
2	1	3011794-029	Keypad Label, Hungarian, 2-Button Unit	

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Keypad Label Language, Biphasic, 2-Button Unit—continued

Item	Quantity	Part Number	Part Description	References
2	1	3011794-050	Keypad Label, Polish, 2-Button Unit	
2	1	3011794-051	Keypad Label, Brazilian Portuguese, 2-Button Unit	
2	1	3011794-054	Keypad Label, Finnish, 2-Button Unit	

Parts Lists

Shock/Hazard Label, Domestic/International

Item	Quantity	Part Number	Part Description	References
5	1	3005349-000	Shock/Hazard Label, U.S. Domestic	
5	1	3005349-001	Shock/Hazard Label, International	

Parts Lists

Warning/Danger Label Language

Item	Quantity	Part Number	Part Description	References
1	1	3005350-001	Warning/Danger Label, French	
1	1	3005350-002	Warning/Danger Label, German	
1	1	3005350-005	Warning/Danger Label, Swedish	
1	1	3005350-006	Warning/Danger Label, Japanese	
1	1	3005350-008	Warning/Danger Label, English	
1	1	3005350-011	Warning/Danger Label, Italian	
1	1	3005350-013	Warning/Danger Label, Dutch	
1	1	3005350-014	Warning/Danger Label, Spanish	
1	1	3005350-015	Warning/Danger Label, Danish	
1	1	3005350-016	Warning/Danger Label, Polish	
1	1	3005350-017	Warning/Danger Label, Brazilian Portuguese	
1	1	3005350-018	Warning/Danger Label, Finnish	
1	1	3005350-019	Warning/Danger Label, Iberian Portuguese	
1	1	3005350-020	Warning/Danger Label, Hungarian	

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LIFEPAK 500 AED Common Accessories

Part Number	Description	Note
3005343-006	LIFEPAK 500 Carrying Case	
3009933-000	LIFEPAK 500 Battery Pouch	
3011200-000	Battery Charger Kit (charger and one domestic power cord)	
3005379-000	Rechargeable SLA Battery, English	
3005379-001	Rechargeable SLA Battery, French	
3005379-002	Rechargeable SLA Battery, German	
3005379-007	Rechargeable SLA Battery, Italian	
3005379-004	Rechargeable SLA Battery, Spanish	
3005379-005	Rechargeable SLA Battery, Swedish	
3005379-006	Rechargeable SLA Battery, Japanese	
3005380-026	Nonrechargeable Lithium Sulphur Dioxide Battery, English	
3005380-027	Nonrechargeable Lithium Sulphur Dioxide Battery, for Aircraft Use (FAA)	
3005380-028	Nonrechargeable Lithium Sulphur Dioxide Battery, for Aircraft Use (CAA)	
3005380-029	Nonrechargeable Lithium Sulphur Dioxide Battery, French	
3005380-030	Nonrechargeable Lithium Sulphur Dioxide Battery, German	
3005380-031	Nonrechargeable Lithium Sulphur Dioxide Battery, Spanish	

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LIFEPAK 500 AED Common Accessories

Part Number	Description	Note
3005380-032	Nonrechargeable Lithium Sulphur Dioxide Battery, Swedish	
3005380-033	Nonrechargeable Lithium Sulphur Dioxide Battery, Japanese	
3005380-034	Nonrechargeable Lithium Sulphur Dioxide Battery, Italian	
3005380-035	Nonrechargeable Lithium Sulphur Dioxide Battery, Danish	
3005380-036	Nonrechargeable Lithium Sulphur Dioxide Battery, Dutch	
3005380-038	Nonrechargeable Lithium Sulphur Dioxide Battery, Brazilian Portuguese	
3005380-039	Nonrechargeable Lithium Sulphur Dioxide Battery, Finnish	
3005380-040	Nonrechargeable Lithium Sulphur Dioxide Battery, Iberian Portuguese	
3005380-041	Nonrechargeable Lithium Sulphur Dioxide Battery, Hungarian	
3200390-000	Nonrechargeable Lithium Manganese Dioxide Battery, English	
3200390-001	Nonrechargeable Lithium Manganese Dioxide Battery, French	
3200390-002	Nonrechargeable Lithium Manganese Dioxide Battery, German	
3200390-003	Nonrechargeable Lithium Manganese Dioxide Battery, Spanish	
3200390-004	Nonrechargeable Lithium Manganese Dioxide Battery, Swedish	
3200390-005	Nonrechargeable Lithium Manganese Dioxide Battery, Italian	

Parts Lists

LIFEPAK 500 AED Common Accessories

Part Number	Description	Note
3200390-007	Nonrechargeable Lithium Manganese Dioxide Battery, Danish	
3200390-008	Nonrechargeable Lithium Manganese Dioxide Battery, Dutch	
3200390-010	Nonrechargeable Lithium Manganese Dioxide Battery, Finnish	
3200390-012	Nonrechargeable Lithium Manganese Dioxide Battery, Brazilian Portuguese	
3005381-000	LIFEPAK 500 to PC Cable	
3005381-001	LIFEPAK 500 to Modem Cable	
3005381-002	LIFEPAK 500 to Printer Cable	
3010779-000	LIFEPAK 500 Setup Transfer Cable	
3005389-000	LIFEPAK 500 Test Load	
3006535-000	LIFEPAK 500 SLA Battery Charger	1
3008374-000	Electrode Storage Tray	
3008497-661	QUIK-COMBO pacing/defibrillation/ECG electrodes with REDI-PAK pre-connect system, English, French, Spanish	
3008497-681	QUIK-COMBO pacing/defibrillation/ECG electrodes with REDI-PAK pre-connect system, English, German, Japanese	

Parts Lists

LIFEPAK 500 AED Common Accessories

Part Number	Description	Note
3008826-661	QUIK-COMBO pacing/defibrillation/ECG electrodes with long lead-wires, English, French, Spanish	
3008826-681	QUIK-COMBO pacing/defibrillation/ECG electrodes with long lead-wires, English, German, Japanese	
3011215-000	QUIK-COMBO Clinical Extension Cable, 48 in.	
3009767-000	LIFEPAK 500 Wall Mount Bracket	
3009933-000	LIFEPAK 500 Spare Battery Pouch	
803650-02	Power Cord – Molded, Domestic (Alternate)	
803650-03	Power Cord – Molded, Domestic (Preferred)	
803650-06	Power Cord – Molded, Australia	
803650-08	Power Cord – Molded, European	
803650-10	Power Cord – Molded, United Kingdom	
803650-12	Power Cord – Molded, South Africa	
803650-34	Power Cord – Molded, Denmark	
3005302-00	QUIK-COMBO Test Post Adapter Kit	

[12-49] 1 Order the appropriate power cord for your country.

Product Line History

This electronic service manual covers all current LIFEPAK 500 AED revisions and models at the time of publication. **Parts Configurator** covers versions released since the introduction of the LIFEPAK 500 Biphasic AED. These units are identified by a 6-digit “dash number” after the part number.

PN 3005400-XXX

Dash #	Language	Voice	Buttons	Dash #	Language	Voice	Buttons
000	English	Yes	3	011	German	No	3
001	French	Yes	3	012	Italian	No	3
002	German	Yes	3	013	Spanish	No	3
003	Italian	Yes	3	014	Swedish	No	3
004	Spanish	Yes	3	015	Japanese	No	3
005	Swedish	Yes	3	016	Finnish	No	3
007	Finnish	Yes	3	017	Mandarin	No	3
008	Mandarin	Yes	3	018	Korean	Yes	3
009	English	No	3	019	Korean	No	3
010	French	No	3	020	English	Yes	3

Product Line History

PN 3005400-XXX

Dash #	Language	Voice	Buttons	Dash #	Language	Voice	Buttons
021	French	Yes	3	039	Korean	No	3
022	German	Yes	3	064	English	Yes	3
023	Italian	Yes	3	065	French	Yes	3
024	Spanish	Yes	3	066	German	Yes	3
027	Finnish	Yes	3	067	Italian	Yes	3
029	English	No	3	068	Spanish	Yes	3
030	French	No	3	069	Finnish	Yes	3
031	German	No	3	070	English	No	3
032	Italian	No	3	071	French	No	3
033	Spanish	No	3	072	German	No	3
036	Finnish	No	3	073	Italian	No	3
038	Korean	Yes	3	074	Spanish	No	3

Product Line History

PN 3005400-XXX

Dash #	Language	Voice	Buttons	Dash #	Language	Voice	Buttons
075	Finnish	No	3	084	Portuguese, Brazilian	Yes	3
076	Korean	Yes	3	085	Portuguese, Brazilian	No	3
077	Korean	No	3	200	English	Yes	2
078	Mandarin	Yes	3	201	French	Yes	2
079	Mandarin	No	3	202	German	Yes	2
080	Portuguese, Iberian	Yes	3	203	Italian	Yes	2
081	Portuguese, Iberian	No	3	204	Spanish	Yes	2
082	Swedish	Yes	3	205	Finnish	Yes	2
083	Swedish	No	3	206	Korean	Yes	2

Product Line History

PN 3005400-XXX

Dash #	Language	Voice	Buttons	Dash #	Language	Voice	Buttons
207	Mandarin	Yes	2	221	French	No	2
208	Portuguese, Iberian	Yes	2	222	German	No	2
209	Swedish	Yes	2	223	Italian	No	2
210	Portuguese, Brazilian	Yes	2	224	Spanish	No	2
211	Japanese	Yes	2	225	Finnish	No	2
213	Danish	Yes	2	226	Korean	No	2
214	Dutch	Yes	2	227	Mandarin	No	2
215	Polish	Yes	2	228	Portuguese, Iberian	No	2
220	English	No	2	229	Swedish	No	2

Product Line History

PN 3005400-XXX

Dash #	Language	Voice	Buttons	Dash #	Language	Voice	Buttons
230	Portuguese, Brazilian	No	2	305	Finnish	Yes	3
231	Japanese	No	2	306	Korean	Yes	3
233	Danish	No	2	307	Mandarin	Yes	3
234	Dutch	No	2	308	Portuguese, Iberian	Yes	3
235	Polish	No	2	309	Swedish	Yes	3
300	English	Yes	3	310	Portuguese, Brazilian	Yes	3
301	French	Yes	3	311	Japanese	Yes	3
302	German	Yes	3	313	Danish	Yes	3
303	Italian	Yes	3	314	Dutch	Yes	3
304	Spanish	Yes	3	315	Polish	Yes	3

Product Line History

PN 3005400-XXX

Dash #	Language	Voice	Buttons	Dash #	Language	Voice	Buttons
320	English	No	3	328	Portuguese, Iberian	No	3
321	French	No	3	329	Swedish	No	3
322	German	No	3	330	Portuguese, Brazilian	No	3
323	Italian	No	3	331	Japanese	No	3
324	Spanish	No	3	332	English	No	3
325	Finnish	No	3	333	Danish	No	3
326	Korean	No	3	334	Dutch	No	3
327	Mandarin	No	3	335	Polish	No	3

LIFEPAK 500 AED Assembly Diagrams

This section contains LIFEPAK 500 AED assembly diagrams as they are installed on the AED final assembly. Each Assembly Diagram depicts a different view of the AED. Numbered call-outs identify the individual AED components. Click on a number associated with a call-out to complete one of two actions:

- Identify a component part number
- Jump to the Final Assembly Versions table if a component is unique to a specific version of the AED (e.g., language specific labels). To identify the part number, click the appropriate AED version on the Final Assembly Versions table to jump to the Unique Final Assembly Parts listing.

Upper Case Exterior Labels and LCD Shield, 3-Button Units
Upper Case Exterior Labels and LCD Shield, 2-Button Units
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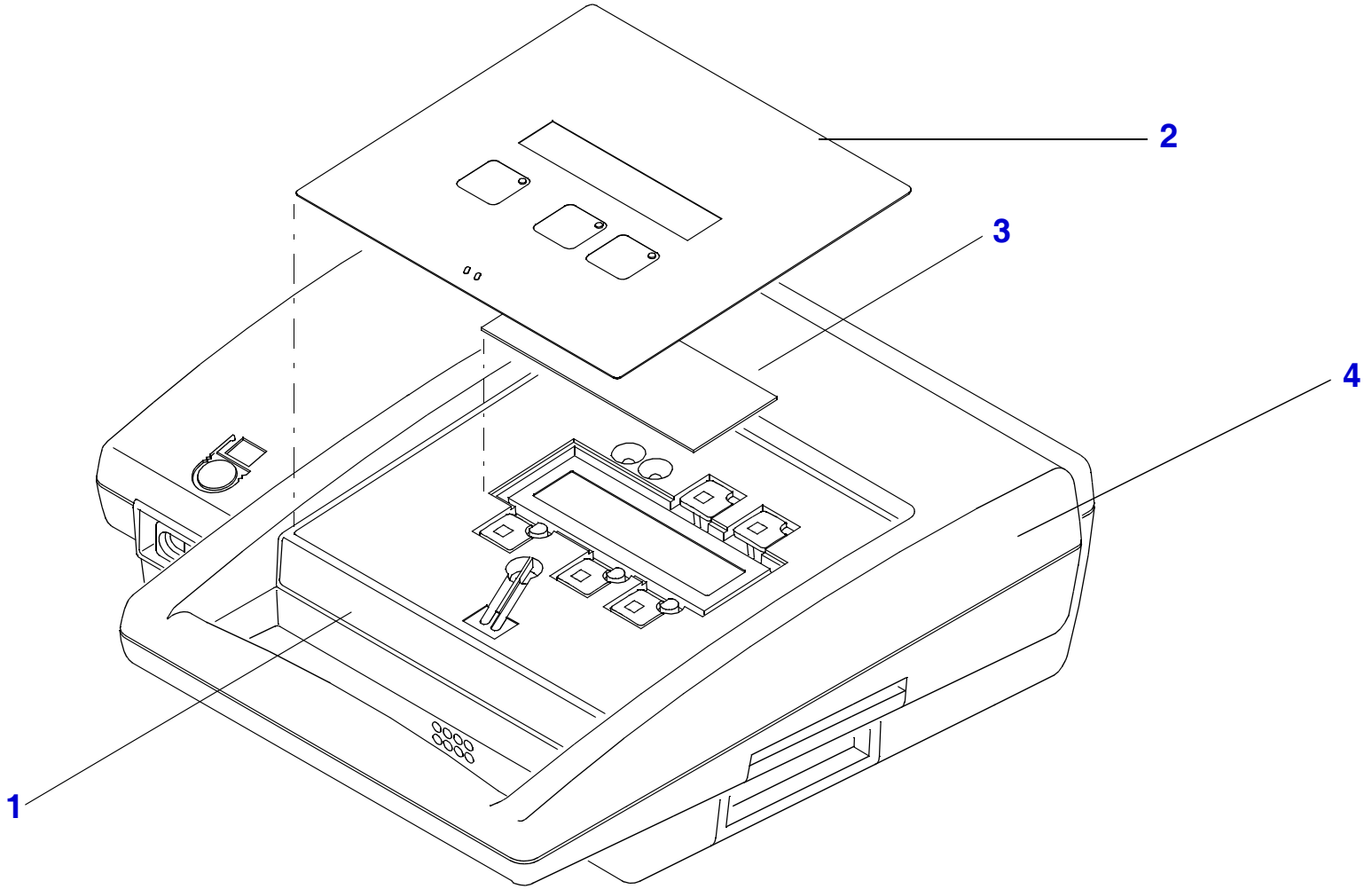
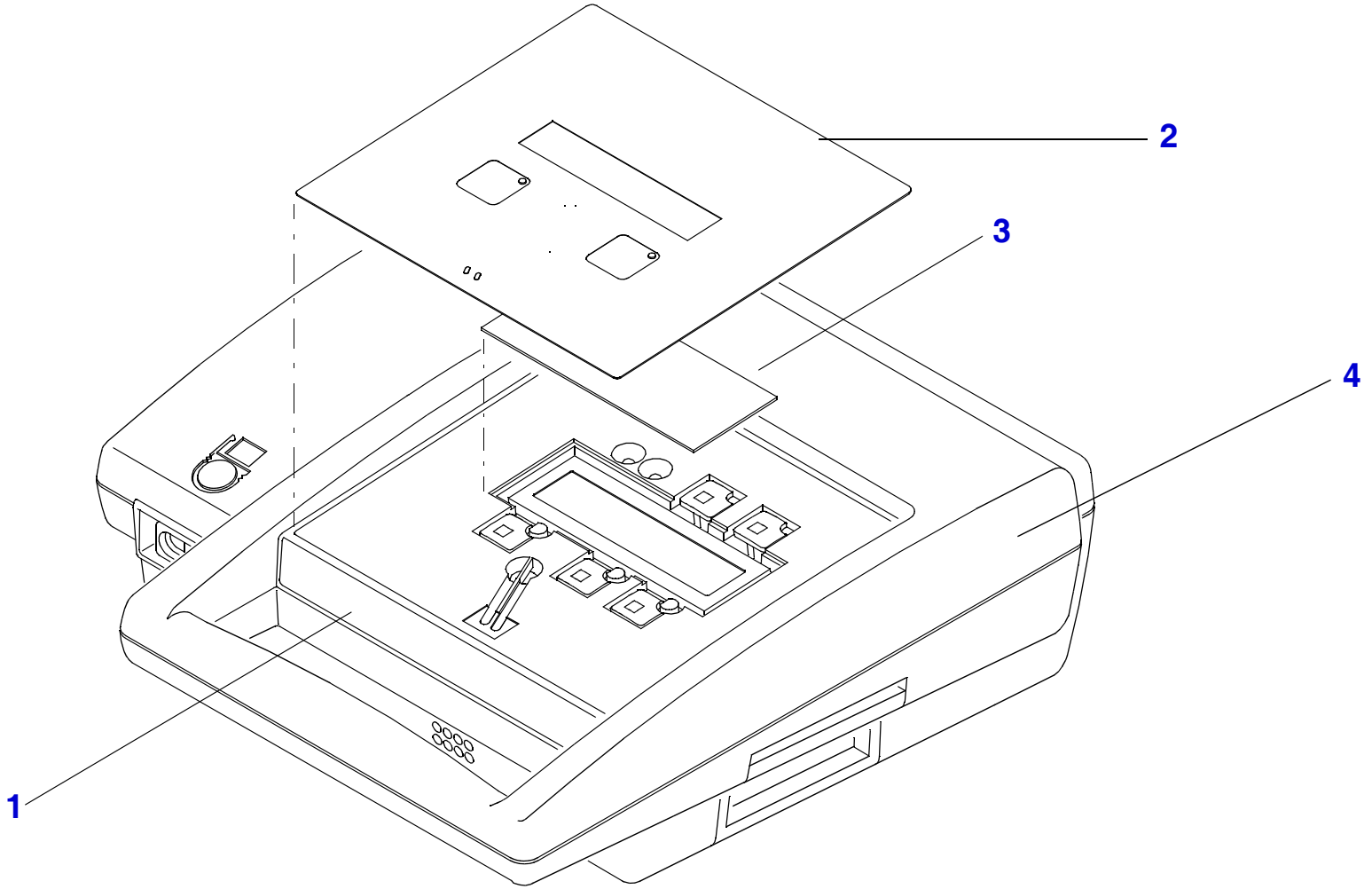
Main PCB and Attaching Hardware
Lower Case Interior Components—Monophasic AED
Lower Case Interior Components—Biphasic AED
Wire Routing and Tie-Wrap Placement—Monophasic AED
Wire Routing and Tie-Wrap Placement—Biphasic AED
LIFEPAK 500 Monophasic AED Interconnection Diagram
LIFEPAK 500 Biphasic AED Interconnection Diagram

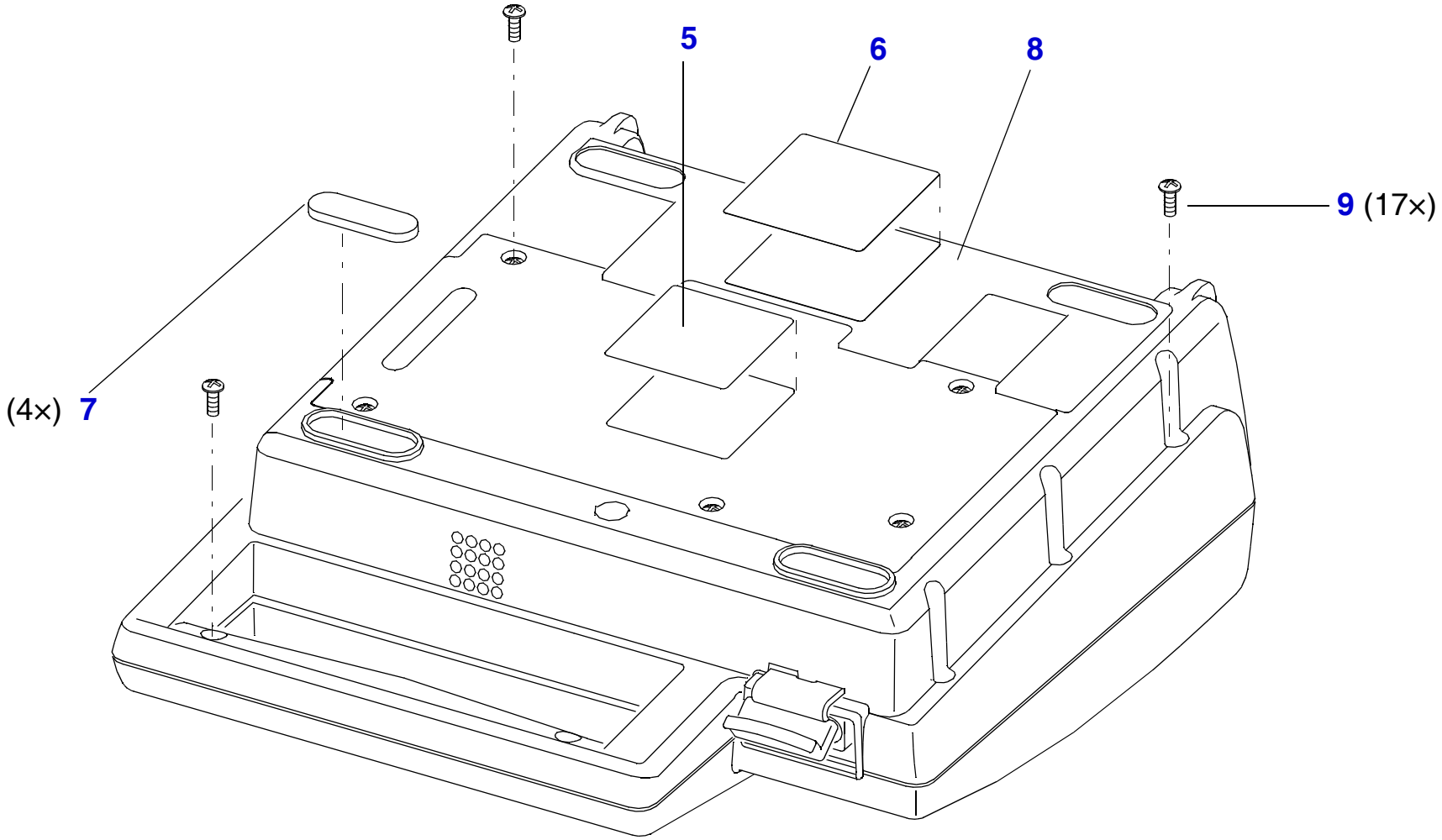
Upper Case Exterior Labels and LCD Shield, 3-Button Units



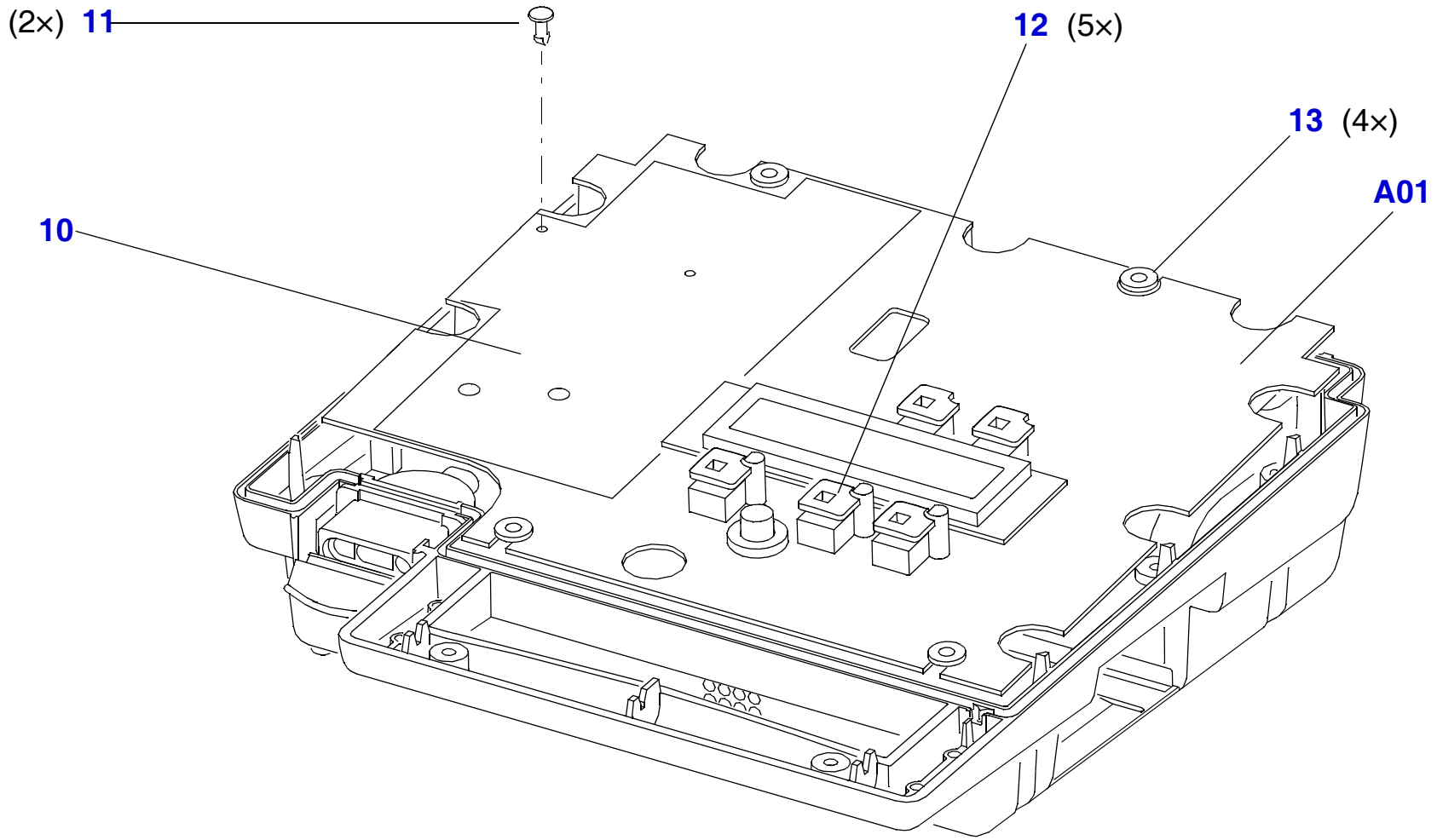
Upper Case Exterior Labels and LCD Shield, 2-Button Units



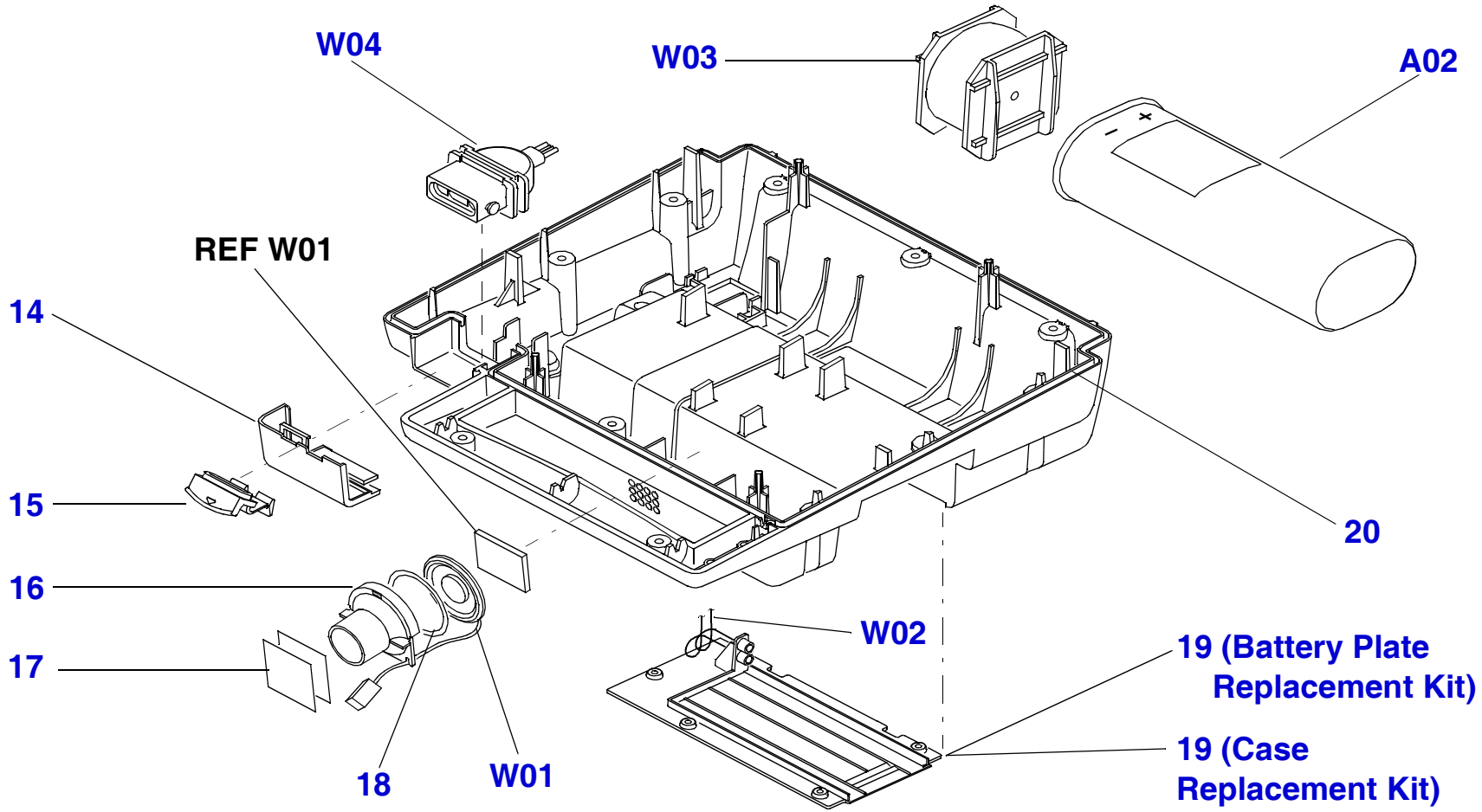
Lower Case Exterior Labels and Hardware



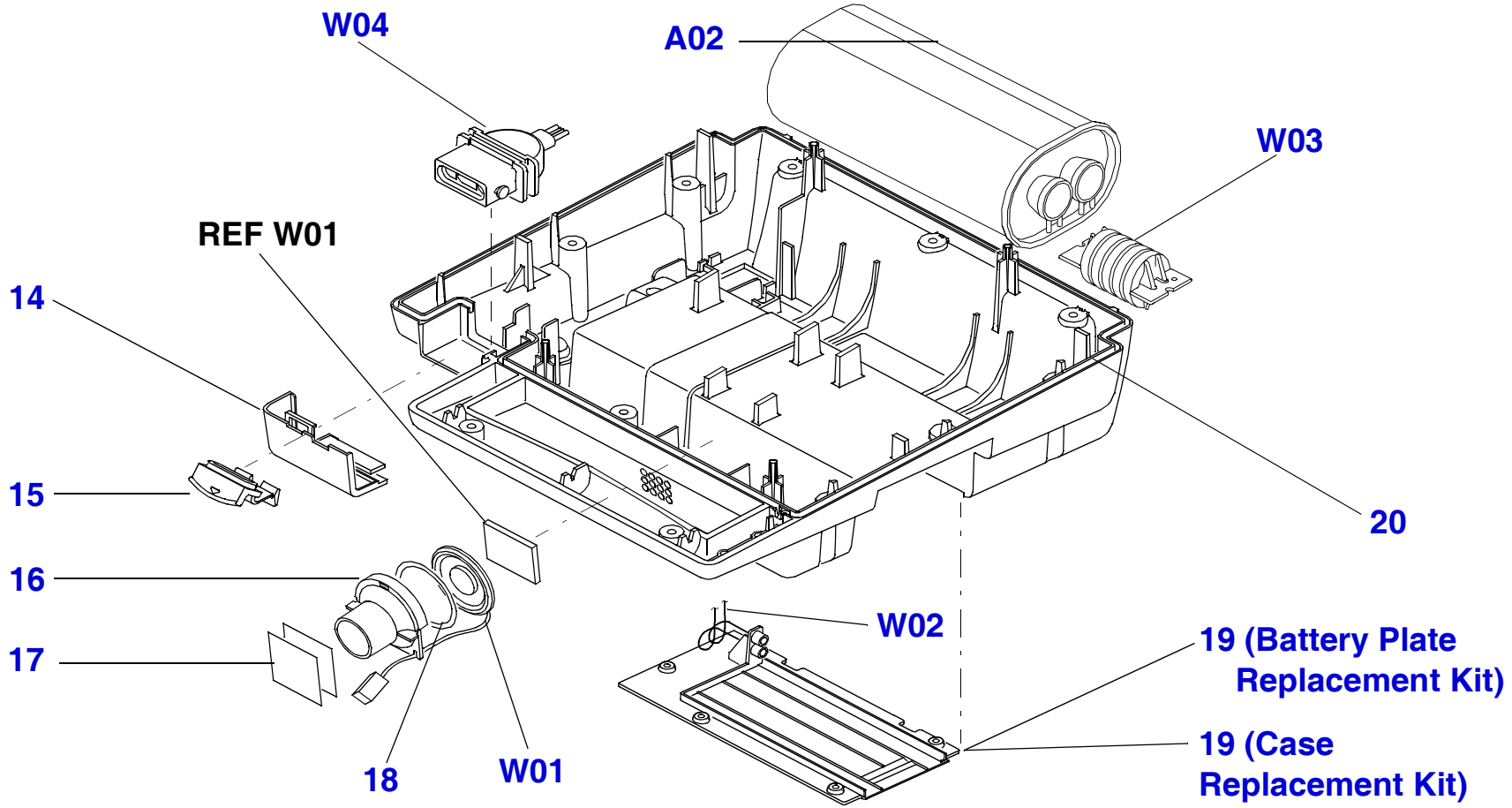
Main PCB and Attaching Hardware



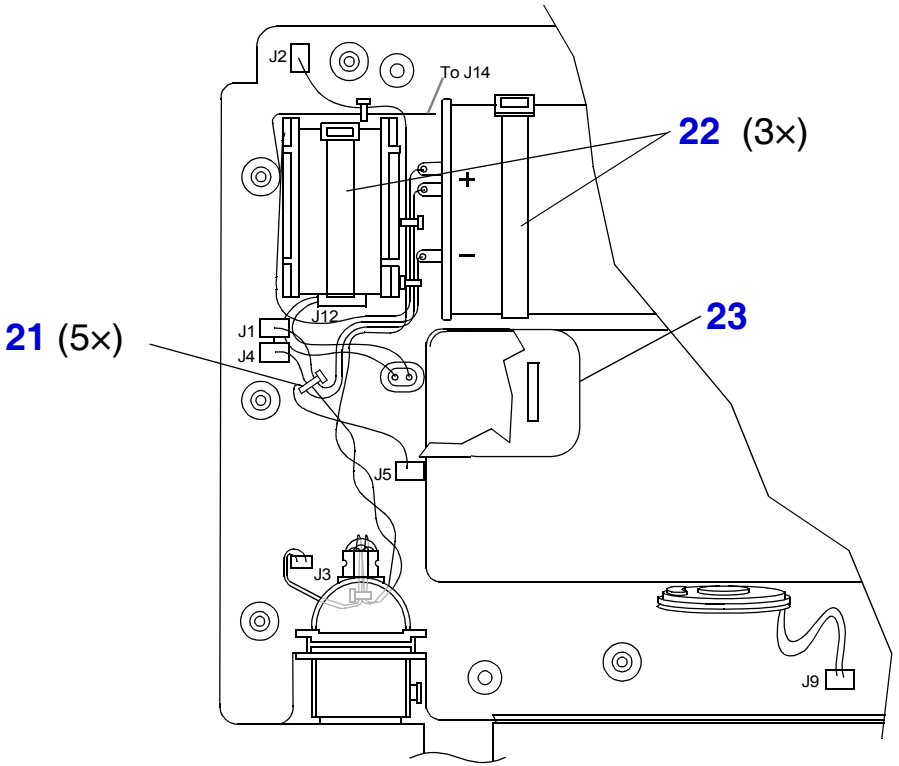
Lower Case Interior Components—Monophasic AED



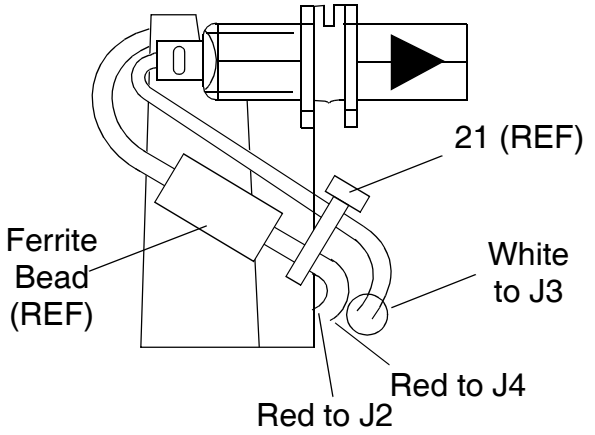
Lower Case Interior Components—Biphasic PCB

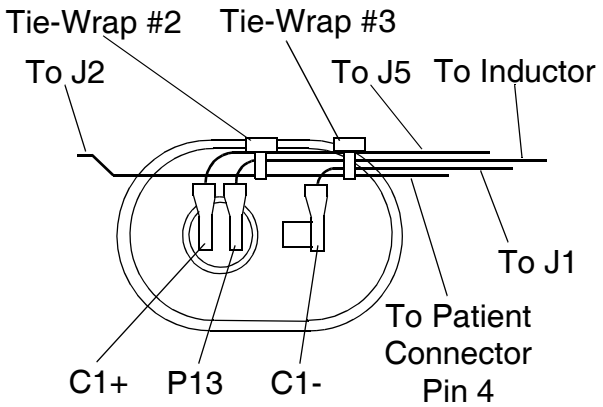


Wire Routing and Tie-Wrap Placement—Monophasic AED



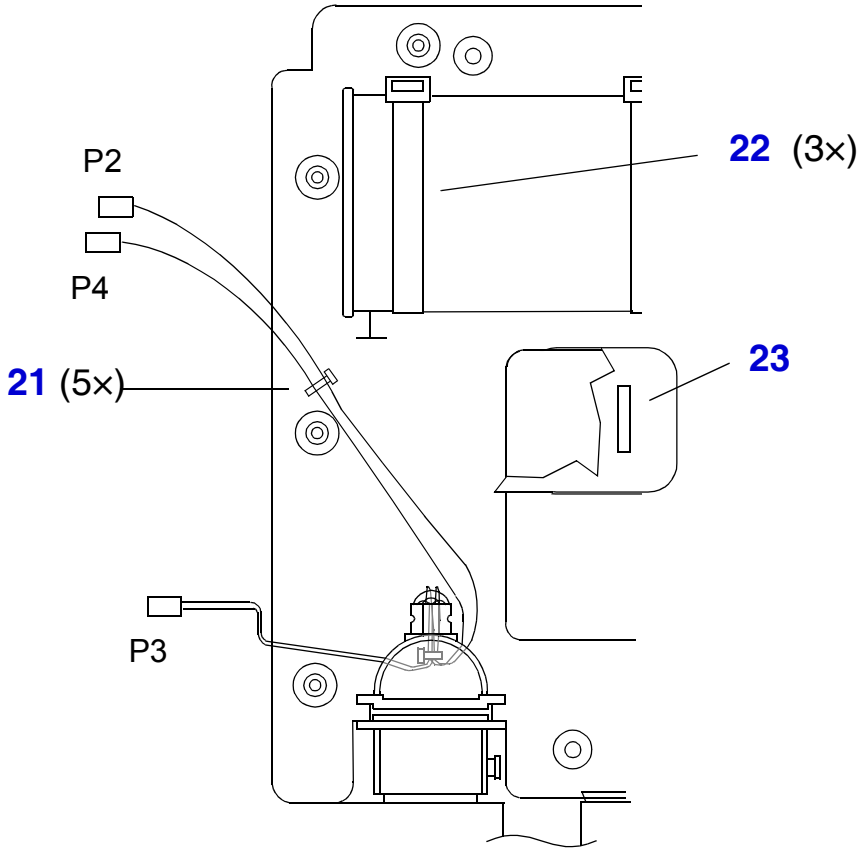
Connectors shown in relative position on underside of the main PCB, which is not



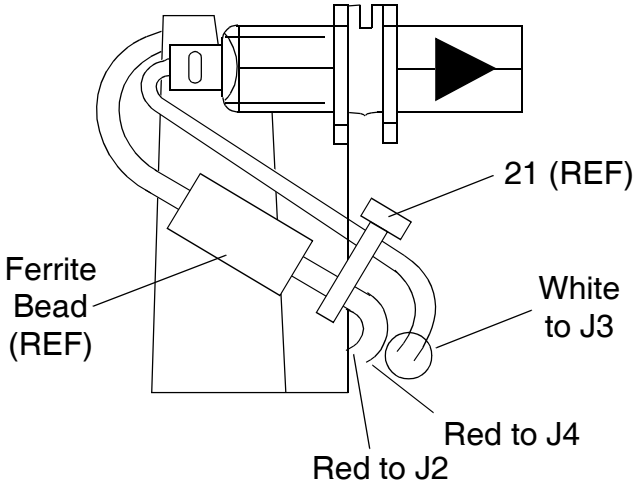


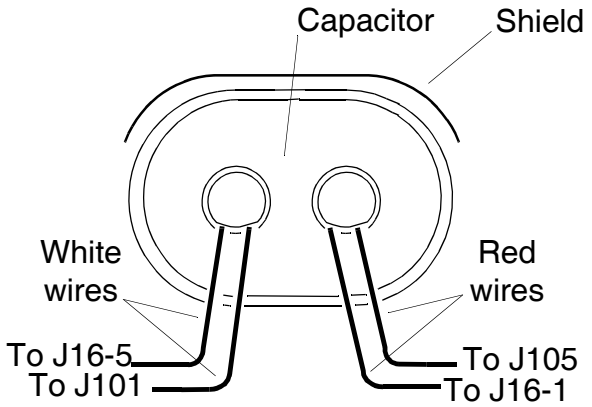
Note: It is critical that the wire connected to J5 on the Main PCB is oriented so that it exits the PCB and routes directly down toward the lower case cavity. It is important that the wire does not loop back onto or near the PCB itself.

Wire Routing and Tie-Wrap Placement—Biphasic AED

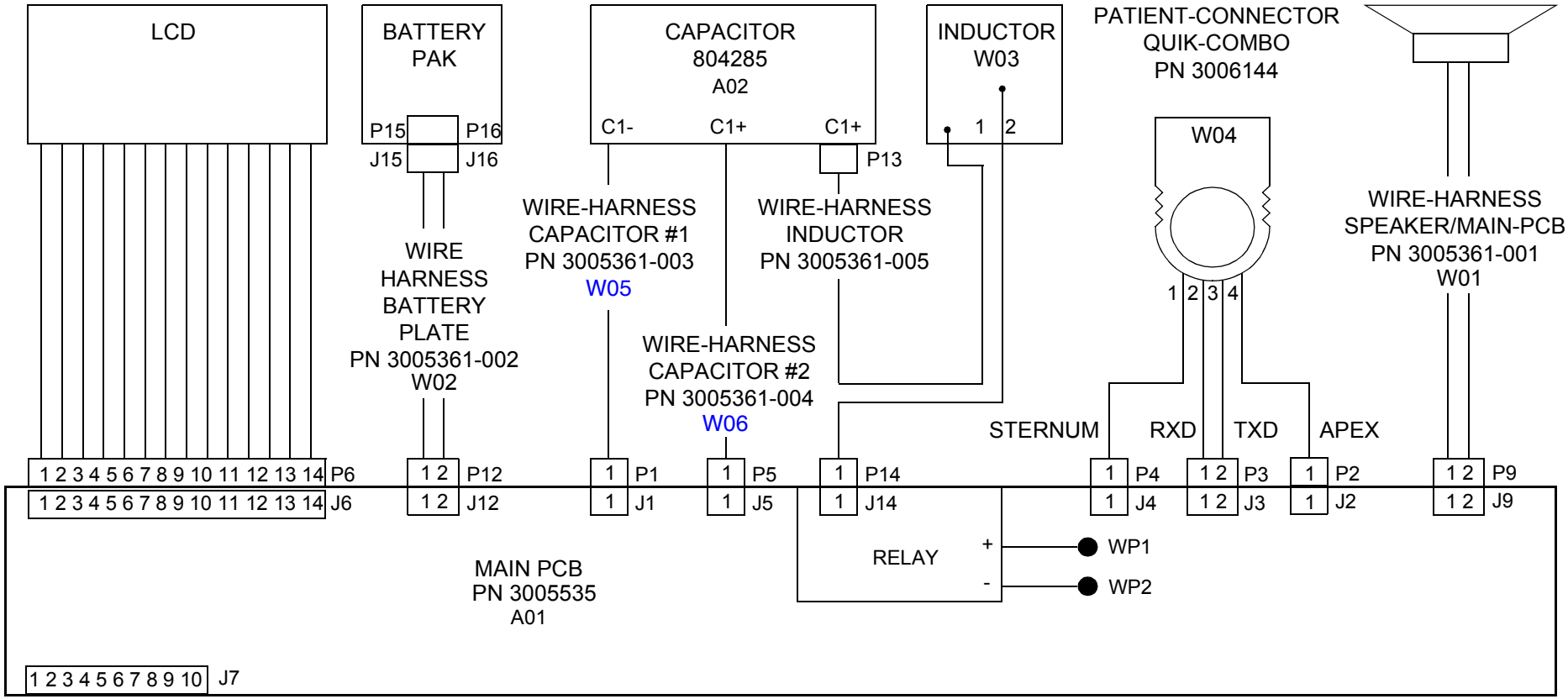


Connectors shown in relative position on underside of the main PCB, which is not shown.

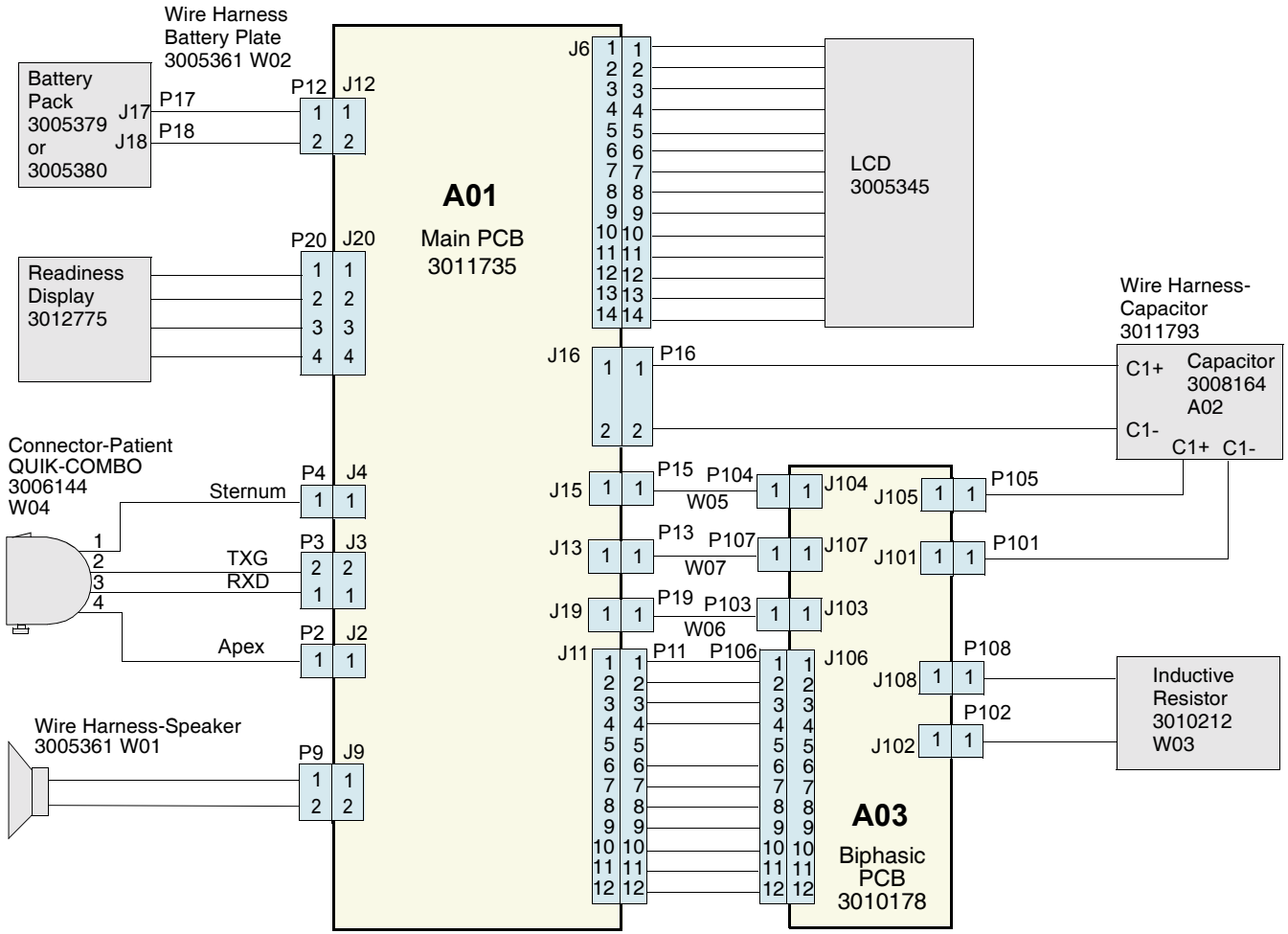




LIFEPAK 500 AED Interconnection Diagram—Monophasic AED



LIFEPAK 500 AED Interconnection Diagram—Biphasic AED



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